

SIR E. JOHN RUSKIN

D.S.C. F.R.S.

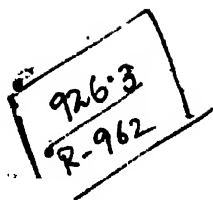
Former Director of the Rötinamsted Ezberiment Station

*The Land
Called
Me*

AN AUTOBIOGRAPHY



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RUSKIN HOUSE

MUSEUM STREET LONDON

TO ELNOR
without whose help the tale would
have been very different

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The Early Years

1872-1887

I was not brought up to agriculture nor was my father. According to our family tradition, however, we were not far removed from the land, for my father's ancestors were said to have been yeoman farmers in East Kent and to have owned the land on which the Faversham Brewery now stands. But my grandfather, John Joshua Russell, left early an orphan in charge of his uncle, was by him wrongfully (so our tradition) dispossessed of his inheritance and he came to London somewhere about 1830, to seek his fortune. He went into the coal business but lacked the gift of prosperity; he had ability, however: among other things a 'Brown Draught' that he invented for horses had some local repute.

He was fortunate in his marriage. His wife Emma Johnston who, born in 1810, had come from Saxmundham to earn her living in service, was a good manager: according to family tradition her father (or uncle) had been one of Nelson's Captains at Trafalgar. My father, Edward Thomas, born at Kennington on September 9th, 1850, was the youngest but one of the seven surviving children. The eldest, a boy, became a blacksmith, then a flourishing industry in London. Two other boys were much more adventurous: James went off to sea and worked in the galley with the cook, while John went first to California and then up the Caribou Trail in search of gold. James was shrewd and industrious; he soon returned home, set up a 'coffee house' where hungry carers could get good meals cheaply and he prospered as he deserved. John had plenty of adventures but they were deemed unsuitable for our ears as children: there were rumours of shooting a man (or at a man), of marital or other tangles, of land in what is now the centre of Vancouver of which he was somehow defrauded but of which he always claimed to be

the rightful owner; so that for the second time the family was done out of land which would have made its fortune.

But my father was a born student and wanted to be a teacher. His father had died in 1861 when he was only ten, but under his mother's management the little coal and greengrocery business in Sun Street, Finsbury, was not doing too badly, and, most of the family being now off her hands, father was able to remain at school as a pupil teacher, and in 1869 to enter the Borough Road Training College, then in the Borough Road and regarded as one of the best of its kind. Here he remained for two years¹ and although he felt the training unsatisfactory in some ways he certainly left with a lively curiosity to know something about all things and an insatiable enthusiasm for omnivorous reading; these lasted all his life. He had already met my mother, a daughter of Captain Samuel Hallett from the West country who had established a wharf at Lambeth (now Doughton's), owned barges and also ran a coastal service. Her mother was Ann Angel, grand-daughter of Captain William Angel, a member of one of the old sea-faring families of Portland; a memorial to him in the Wesleyan chapel there records his death in 1844 at the age of 94 and states that he was one of the first converts to Wesleyanism in the island. My mother, Clara Angel Hallett, was born on August 6th, 1850, at 18 Lower Fore Street, 'district of Lambeth Church': she was the youngest of the family. By that time her father had developed asthma and she being his favourite daughter was deputed to nurse him. He died, but the strain had been great and she developed lung trouble which she never shook off, and in the end it cost her her life. She always thought she could have escaped had she been allowed to skip and play games, but this her mother forbade for fear that she might spoil her clothes. Her brothers followed their father's occupation but lacked his stability.

She and my father met at Spurgeon's Tabernacle about 1868. Spurgeon was then a great figure in London and enormously impressed the young people. He was fired with burning zeal; he had a simple and very vivid theology easily understood by the multitude and a forceful, often humorous, way of expressing himself. He trained up a band of young men to preach at street

¹ Jan. 1869 to Dec. 1870; the Sessions then went by Calendar years.

corners: my father was one of them. But, he said, when you are praying, don't put your hat and Bible on the ground and shut your eyes; you will probably find someone runs away with them. His book on the art of preaching remained one of my father's favourites. He could be dramatic at times: in one sermon, my mother said, he slid down the rail of the pulpit steps saying: 'That's how people go to hell'. Then he had walked slowly and painfully back into the pulpit: 'And that's how they go to Heaven'.

It was at a young people's excursion that my parents first met. They were going somewhere in horse drawn waggonettes, a favourite type of chapel excursion for many years; the day began to cloud over and my mother had forgotten her cloak. Her house was not far away and a quickly moving young man would get it in a few minutes. My father (probably after a reconnoitring look at the lady—she was very comely) gallantly volunteered; they spent the day together, and he was invited to her house. Her mother wasn't quite sure about it: he had the tremor in his hands which afflicted the Russells, and her mother thought this denoted heavy drinking. It was true he took only water at her house, but 'young men are wily', she said, 'and you can't be too careful'. However, he had done well at school and had chosen the newly developing teaching profession; he was now at college. So he was accepted as son-in-law. He got his first teaching post at Saul in Gloucestershire in 1871, went down there soon after leaving Borough Road College, and returned to London in the Christmas holidays, married my mother on December 26th and took her back to Frampton-on-Severn to the two rooms that were to be her new home. They were in a house down the passage off the right-hand side of the Green as you go towards the Church; it is modestly tucked away on the right-hand side, and it has a bee-hive carved over the door. There on October 31st, 1872, I was born.

Father was quite unsuited to country life nor did he know anything about it. He found his local Managers tiresome: they objected, for example, to his teaching the children to sing—

'Oh! where and oh! where is my Highland laddie gone'

because it was so palpably untrue: none of them had a Highland

THE LAND CALLED ME

laddie. He soon got into the bad books of both squire and parson, and he did not approve of what he called the big farmers. He was always 'leftist' throughout his life. Agricultural wages were pitifully low, especially for children; this greatly aroused his indignation. He had even told me of a child being paid only 2d. and a turnip for a week's work.

Life was pretty hard for them. His schoolmaster's salary was very meagre and was partly made up of the pupils' weekly payment of twopence which was not always forthcoming, not infrequently mother had only about 15s. per week on which to keep house. She was much less leftist and fully accepted the rather feudal structure of the village; she liked the Green and the fields, the fresh air and the abundance of apples. All the same it was with much relief that they left Frampton in 1873 for Sheffield, where he went not as headmaster but as assistant teacher, at, however, better pay and with better prospects than in the country.

They were both very happy at Sheffield and my mother usually looked back on those days as the happiest in her life. They had a little house of their own in a row, 255 Gleadless Road, Nether Hallam, and a little garden. There were many movements stirring in those days: scientific, social and religious, and father was curious about all of them. It was the first time he had come in contact with Science and he devoted himself to it with the whole-hearted and almost religious enthusiasm of the novice. He purchased some chemical and physical appliances, and in the evenings made experiments in our kitchen; he bought some Chemistry books and began to read Darwin and Huxley.

Before long he had to give up the simple Hell Fire theology of the Tabernacle. As often happens he swung to the opposite extreme: the Freethinkers were busy and he joined them, but as this would have been disapproved by the school authorities he went under the name of Edwards. They organized scientific lectures and he became one of their lecturers. However this did not long satisfy him. By chance he got a copy of the Unitarian journal, *The Inquirer*, and liked both the spirit and the matter, but he did not then join the body although he continued surreptitiously to read the publications. Meanwhile he was getting on well at school for he was a good and successful teacher, and he

obtained additional work which greatly interested him as teacher of chemistry in the evening classes at the Mechanics Institute, an organization set up to give some education to working men. His income was low but mother was a good manager and it more than covered expenses.

My earliest recollection is of strutting about just outside the house wearing my first knickerbocker suit which mother had made for me, and singing a favourite hymn of my mother's, which, however, I never got quite right, so that my version ran:

'Had I the wings of a dove, I would fly

'Far, far, away from Johnnie. far, far, away from Johnnie'.

Everything was going well, and then came the crash

Father had been successfully sitting for some South Kensington certificates and he applied for and obtained a bursary to attend a short course in biology under T. H. Huxley at South Kensington in the summer of 1876. It had been the dream of his life to meet a great scientist and to work with him if only for a short time, and to his intense delight here was the chance. He applied to the school authorities for leave of absence: to his dismay it was refused. He was not the man to give up the hope of realizing a long cherished ambition and he resigned his post at Sheffield and attended Huxley's course. He kept his notebooks: they were remarkably well done. The laboratory work was good, especially the drawings of the dissections. Father had undoubtedly the gift of rapidly assimilating new knowledge and presenting it in simple and attractive form.

For mother, however, it was a serious matter. She had two little children, a third was expected, she had got a home together, and now it was all to be lost simply for a short course in Biology. She pleaded with father to stay: he was getting on well at school and at the Mechanics Institute; one never knew what might come of the Institute and he might advance with it. (Actually it became the Firth College and later the University.) But he was adamant.

The three weeks passed, and though they always remained as a glowing memory in my father's life, they brought him no work. Nothing was going then but the post of Head and only teacher at the very small school at Lee Common, Bucks, and he

had to accept that. We lived in the school house adjoining the school; it had two rooms up and two down. Father and mother both taught in the school, and in addition were expected to take an active part in running the chapel. This put father in a difficulty; he could not preach the fiery doctrines which the congregation wanted. Fortunately he found a way out. There was an old harmonium but no one could play it; father would do this and would lead the singing. It so happened that there was no lack of local preachers but a serious dearth of musicians. Father knew nothing of musical notation except a very little tonic sol-fa, but he bought a harmonium for himself, also a beginner's book on music and the tune book for the chapel hymns; he was in the commanding position of being able to choose the hymns himself, and by keeping to old favourites which everyone knew, and diligently practising during the week, he succeeded in playing the top and bottom lines, the treble and the bass, sufficiently well to meet local requirements. We had to attend the 'Love Feasts' and the baptisms in a tank in the chapel floor; people wore a long cloak for their total immersions.

Mother taught me to read, but I went to some of the classes to learn writing and arithmetic, and father passed on to me his knowledge of the harmonium. We made no friends among the children. Some of the older boys would speak to us, but very coarsely. My great preoccupation was to make an engine like the one that had brought us to Tring: we had never seen a train since that day, but I thought I remembered the details sufficiently well. We had some boxes, nails and a hammer and there was a woodshed in which I worked. I spent weeks at it, and then when it was nearly complete, (except that the boiler was square, but I had no round box) I tried to take it into the garden and pull it along the path, but found to my intense disappointment that in making it I had nailed it firmly to the floor: now could the united strength of us two children move it.

Life was hard for the villagers. The poverty and ignorance were terrible. Some of father's committee could neither read nor write. The men were all agricultural workers, very poorly paid; the women made straw plait, and in the winter sat shivering round a charcoal brazier that gave out hardly any heat. The favourite dinner was fat bacon dumplings and cabbage, for which

indeed there is a good deal to be said. As at Frampton, father got up against established authority because enclosure of some common land was going on, and he did not think the commoners had been treated fairly. Mother was reasonably happy here, but always regretted leaving Sheffield. We children loved the lanes and the flowers. We rarely went far from home. Once I was taken to Missenden, our urban centre, to get my hair cut, though for the rest of the time father did this himself, putting a basin on my head to get the edges straight. Once too the local chapels combined for a big central function, at Chesham I think: I went dressed in a sailor suit and had to sav a piece entitled 'Little Jim':.

'The cottage was a thatched one,
The outside old and mean,
Yet everything within that cot
Was wondrous neat and clean.'

and so on. It was my first public appearance and I got through that all right. But I had to stay the night in a strange cottage and in very strange surroundings: next morning I was unwell and had to be driven speedily home. At the chapel functions lodgings for visitors were always a great difficulty, and not infrequently the visiting preacher would have to share a bed with one of the family. We heard of one who had to be the third in the bed: the host said to his wife 'Push up Betty, preacher's coming', and then got in himself and invited the preacher to take the outside place.

We did not stay long at Lee. The Leicester Unitarian Church under the Rev. John Page Hopps decided to set up a Ministry to the Poor, and they wanted a layman in charge. Father heard of this and applied: he was invited to go and address the young men one week-day evening. He went and gave a talk on rivers, illustrating it with blackboard drawings. He had gradually acquired a certain number of books and his reading had been wide, if desultory; his lecture greatly impressed the members of the selection committee. Here, they thought, is someone who will interest and teach these young people; they wanted not an evangelist but an educator, so they offered the post to him. It was early in 1877, and I remember his coming home and telling

mother the salary was to be £120 per annum, but, much more important: 'it was a step up in the social ladder'. I had no idea what that meant, but it was clearly something satisfactory, and in March they both left Lee without regrets.

Before long we were four children and I the eldest was not yet six. At Leicester we lived at 61 King Street, then very much as now, facing the Crescent and a beautiful row of chestnut trees, the flowers of which we called 'dollies'. My first feeling was of dreadful disappointment: there were no hedges and no flowers; nothing we could pick and carry home. I asked in tears to be taken back.

Trouble soon set in. Scarlet fever broke out in Leicester. Father visited his people and, as he knew little about precautions, the fever reached our house. Laura, Arthur and Clara went down with it; by a miracle I did not. Father sent an urgent appeal to his sister Eliza in London: could I go there to escape? Aunt Eliza had a little child of her own but she generously invited me. So I was put on the train at Leicester and sent up to London in charge of the guard with instructions to meet my aunt at St Pancras and go home with her. But I was also cautioned against all sorts of other women and men who might want to kidnap me. Never having seen my aunt it was not easy for me to recognize her; fortunately, however, she had no difficulty in picking out the small boy of five with his bag, looking anxiously around for his conductor. She and my Uncle John kept a coffee house in Hampstead Road, just north of Euston Road: big burly draymen and carters would come in and order 'a cup of cor-fee and a door-step', i.e. a very thick slice of bread and butter or jam, or 'a one-eyed steak', i.e. a bloater. A copious dinner could be had for nine pence and a special one for a shilling. On occasion my Uncle John Gant would don his 'business things'—a tall hat and a long black coat—and take me to see the sights. Temple Bar was still standing in the Strand and he showed me where the traitors' heads used to be stuck; we visited the Zoo and had penny rides on the Thames steamers. On the Underground the smoke and sulphurous atmosphere made me cough violently but I was told this was good for consumption, and I was regaled with tales of old ladies in very full skirts and loaded with parcels who could not get out of the carriage in time, and so were carried on past

their destination, and went round and round the circle, apparently *ad infinitum*.

The climax was the Christmas party, when all my uncles, aunts, and cousins, with approved prospective husbands and wives, attended: there were about fifty in all. Grandma presided, and she was very proud of her big family of children and grandchildren. The time was passing pleasantly enough.

Then came shattering news. A postcard arrived to say that my sister Clara was dead. The fever had led to diphtheria, in face of which doctors then were helpless and could do nothing. I had loved her dearly. I sat down dazed: I could neither speak nor cry, but read the postcard again and again. Uncle John saw my distress and cut me a thick slab of cake, a rare treat in those days. I felt sick and went to bed.

Not long afterwards our home was safe and I went back, though it was a very sad return.

Father took some trouble about choosing a school for me and he sent me to a small 'private school for gentlemen's sons' kept by Mr Moore in a square close by; the fees were about 7s. 6d. a quarter which was thought high, but it meant that the school was select. Certainly they were a nice clean lot of boys, and I never remember hearing either bad language or dirty talk, nor was there bullying. But now arose the question of clothes. Mother had always made mine, and this had answered well enough so far. But she was now reduced to cutting down one of father's old suits for me to wear. The boys soon spotted that it was not tailor made and asked me where it came from: I told them the truth about it, being rather proud of mother's skill. But they laughed inordinately, and teased me so much that I broke down. Mother very nobly withdrew the suit on which she had spent so much labour and at I know not what sacrifice bought me a suit from the shop, and so ended the teasing. She never would have us laughed at, but she was too sensible to lodge a complaint, her method always was to remove the cause.

But the education was deplorable and roused my father's ire. Books and methods were alike antiquated and the lessons were made more dreary by the long uncomfortable desks at which we had to sit. But poor Mr Moore was in a difficulty: he had only a boy to help him, and the two together had to cope with some

fifty to eighty scholars of all ages. Father insisted that either the methods must be improved or I must go. Mr. Moore responded by giving me a prize 'awarded to Master E. J. Russell for top marks for Good Conduct and General Excellence', a little book by Lee about birds and animals with coloured illustrations that gave me much pleasure. Father, however, refused to be mollified and so in January 1880 I was sent to the new Board School in Hazel Street. The Head Master was Mr Milne, an intelligent man who impressed father; my immediate teacher was Miss Riley, daughter of the organist at Mr Hopps' church. I deeply loved her and on the way to school would wait at a certain street corner where I knew she would pass, then when I saw her I would walk slowly on towards the school so that she could overtake me without knowing that I had waited. Then she would let me carry her bag; it was the happiest part of the day. At night before going to sleep and in the morning before getting up I would picture her beset by lions or tigers or wicked men, or in danger of being drowned, and I would rush in and save her.

For some time there was a happy spell at Leicester. Father enjoyed his work at the mission. He was a lay-worker dressed like anyone else; he believed, and his committee agreed, that the way to improve the poor of Leicester was to educate them, and this was always the line he took in his visits to their homes. Also he taught the boys to play cricket. But there was much dire poverty and he was generous; the funds at his disposal did not always suffice and he would sometimes come home to take one of our blankets for someone in greater need. He took the services on Sundays, but they were very simple and direct; the burden of his teaching always was: lead a good honest life, and try to get on. He was happy too in his dealings with the Great Meeting Congregation. He entirely accepted the Unitarian presentation of Christianity as also did my mother, and they both greatly admired the transparent honesty and sincere goodness of life of some of the leaders. Then, too, there was an intellectual atmosphere at Leicester that father liked. He joined the Leicester Literary and Philosophical Society, already an ancient institution, and regularly attended its meetings: on occasion he would demonstrate his electrical and chemical appliances. Although I was only about eight he took me to the meetings and to the

botanical excursions, feeling that one could not begin too soon: a few of the old gentlemen looked askance but father remained unperturbed.

Like other 'leftists' of the time father was a republican. He would talk disparagingly of the 'Widow of Windsor', and would stick stamps on his letters upside down, giving each a vigorous bang with his fist and saying: 'There!' Mother did not approve, and kept him from going any further or making any demonstration.

Although the town would ordinarily be described as quiet there was plenty of incident in the street which delighted us children. First and foremost, though all too rare, was the Punch and Judy Show which would set itself up in some place where an audience could collect without blocking the traffic. Next came the big piano-organ mounted on wheels, and worked by an Italian: when he turned the handle it not only played tunes but set in motion a gaily coloured picture mounted on its front giving us a panorama of beautiful scenery. Then there was the little hurdy-gurdy, a much smaller affair like a box, supported by a strap from the shoulder and resting on a pole; this lacked the musical value of the bigger instrument but as compensation it had the crowning glory of a tame monkey that sat on top, often dressed up, and trained to collect the pennies. A German band would periodically perform at the end of the street; it was usually dominated by the trombone, and not infrequently received a small sum to go away. Then there was the polyphonic individual who played about five instruments: a drum on his back with the drum sticks fixed to his elbows; cymbals on his head, which he worked with one of his feet; pipes tied to his neck so that he could play them with his mouth; a triangle hanging to his wrist; and another instrument—variable, but it might be a zither or concertina—operated by his hands. Occasionally to our great joy there came a dancing bear.

There were also beggars who walked slowly down the street often accompanied by a little child said to be hired for the purpose, singing dolefully as they went. Then there were the craftsmen. The knife and scissors grinder had a gaily coloured machine with a grindstone driven by a large wheel worked by a treadle. The repairer of rush- and cane-seated chairs would sit

at the edge of the pavement and do his work there; so also would the riveter of china. The glazier came round to mend windows, carrying a stock of glass in a wooden frame on his back. The 'rag-and-bone man' pushed his hand-cart, announcing himself loudly and in return for sufficient rags and bones would give a piece of bath brick which we needed for cleaning the hearth and the steps, or else some 'raddle' to give them the bright red colour we liked to see. The 'old clothes man' also came round periodically.

But there was another side to the street incidents. Occasionally there would come the mad rush of a runaway horse belting headlong down the street, dragging after him a trap which swayed to and fro, making a dreadful noise as it rattled over the cobbles and looking as if at any moment it might crush me to death. The only safe place was an entry and I would run for the nearest. Sometimes the street in front of a house would be covered with spent bark from the tannery to reduce the noise of the traffic because there was some sick person within.

For some time mother was quite happy. She looked up to and admired some of the ladies of Great Meeting, her neighbours were kind and helpful and she was so good a manager that although there were four children she made the income of £120 suffice. She had always wanted a 'doorman'¹ with a bonnet to match, these being the mark of a middle class lady, and after a time had saved enough to get them. But she did not achieve another wish: to taste halibut.

Mother had a marvellous instinct for the bringing up of children, and in spite of her meagre resources fed us well; yet each meal could have cost only a few pence. She made use of some of the very cheap foods then available: very fat bacon in which bread was fried, which we had for breakfast; bones from the butcher; potherbs, a mixture of vegetables unsaleable at full prices because they were bruised or wilted, and of which one penny would purchase a good quantity; these were made into a thick soup for dinner; and 'household' jam to go with the roly-poly suet pudding or the boiled rice. We had a joint only on Sundays, followed, while the season lasted, by an apple pie.

No beer or other drinks ever came into the house nor did my

¹ A black silk coat trimmed with beads and reaching about to the hips.

father smoke. The only luxury my parents permitted themselves was an occasional jug of tripe and onions bought from the tripe shop on Saturday evening, but in this we shared.

However, our mode of life was not altogether healthy and the winter tried us sorely. I invariably had a cough most of the time; in fact my mother was wont to say that no one expected me to live beyond about five years. For my cough mother gave me liquorice in the early stage and occasionally black currant tea, though this was too dear for frequent use. The great stand-by was onion syrup, made by putting into a jam jar slices of a big onion alternately with layers of brown sugar; after a few days a thick syrup was formed which I used to take. If all these failed a linseed poultice was put on my chest. By spring our blood was 'out of order'; we became pale and pimply, and were given each morning a tablespoonful of brimstone and treacle, made by stirring flowers of sulphur into treacle. It was not pleasant though endurable. We always hoped it would suffice; if it did not we got an abomination called 'Turkey rhubarb', a yellow powder of execrable taste. I had headaches too, which none of mother's arts could cure, so father took me to a homoeopathic doctor who gave me some sweet little pills, but the headaches still persisted. Apart from this I never saw a doctor till long after I had left home, nor did we ever visit a dentist. The chemist pulled out our teeth at 6d. each, to which mother added a penny for the patient because he or she had been brave. These visits were rare, and in spite of the fact that we never used tooth-brushes we all had excellent teeth.

My happiest recollections of my mother at this time were of our evenings when, father being out, we would sit round the fire making a patchwork quilt out of pieces of coloured rag, or paper spills which we kept in a vase on the mantelpiece, or a hearthrug out of pieces of cloth cut into strips about three-quarters of an inch wide and two inches long, which were then threaded through two holes in a piece of sacking: nothing was wasted in our house, neither material nor time. Or we would make frames of straw to go round the cards which we wanted to hang up in our bedroom alongside the coloured texts on glossy paper: 'God is Love', 'Love your neighbour', that were our chief adornments. Meanwhile mother would tackle the heap of darning and mending that

seemed perpetually to renew its youth, and as she did it she would tell us of the things about which she had heard: of the opening of the Suez Canal in 1869, or the terrible Tay Bridge disaster of 1879, or of that dreadful burglar Charles Peace who was hanged in February 1879 to the intense relief of all honest householders, or of the wonderful General Gordon. We never had a newspaper, but father would see one at the library and tell her what was happening. Sometimes we would sing 'Watching for Pa', or a Sankey and Moody hymn, or mother would sing to us some of the songs or glees she had learned as a girl for the Crystal Palace Competitions in which she used to take part. Every evening after we were washed and in our night-gowns ready to go to bed we knelt at her knees to say our prayers: one for the family, a verse from 'Gentle Jesus, meek and mild', and 'Our Father'. When occasion offered she would give us some moral instruction: on the need for honesty and truthfulness and straightforwardness, for keeping one's word in all conditions, for helpfulness to others and for temperate living. But above all she urged the need for truth: her eyes would flash as she said 'I hate a liar'. Of course when father was at home it was different; he wanted to read and we must all be quiet and go early to bed while he would sit with the gas jet pulled down to the level of the book because the burner, a 'fish-tail', gave so poor a light.

For mother the Sunday afternoons were the best. For a couple of hours she took us three children into the front room (used only for special occasions: we ordinarily lived in the kitchen) to sit near the window where we could see the chestnut trees on the Crescent; she would sit on the horse-hair covered 'easy-chair' (not at all easy by modern standards), and would read Mrs Henry Wood's *East Lynne* to us or would sew while I read the sermon from the *Christian World*. Her favourite author, the blameless Emma Jane Warboise, she never read to us.

Once a year we were taken to an afternoon performance of the pantomime. Very occasionally she and father would go to other performances, otherwise her only outings were to the Great Meeting or to the mission on the occasions when it was deemed suitable that she should put in an appearance.

Although mother never would admit poverty we were driven

to all sorts of economies. The kitchen 'copper' was one of our most important utensils, as it was needed for our washing. Periodically its chimney had to be swept; for this the sweep would have charged one shilling. Father saved most of this by buying some gunpowder, wrapping it up in paper and putting it at the back of the firebox, laying a trail of paper to the front, lighting it, then closing the iron door of the box, and holding it with a long-handled broom against which he leaned with all his weight. We waited breathlessly as the fire slowly crept to the gunpowder, then came a terrific 'Puff!' and the soot all blew out of the chimney and fell back into the fire box. We were not alone in effecting this particular economy: a favourite device was to wait for a fog and then set the chimney on fire; this was forbidden by law, but in the fog the police could not usually tell which particular chimney was emitting the smoke.

Little Clara's death had not ended our troubles. Later on another brother was born, Percy Garfield, named after the American President recently assassinated, whom father had greatly admired. When only a few weeks old he was sleeping in his cradle before the kitchen fire, while mother was in the scullery washing. Some of the clothes were hanging on the clothes-horse in front of the fire, drying. Suddenly mother heard a piercing cry; she came in to see what was the matter. To her horror the kitchen was full of smoke, the clothes-horse and the cradle were both in flames. She rushed to the cradle, picked up the baby and ran into the house next door to the two old ladies. The child was still alive but badly burnt; a doctor was fetched, a policeman also to put out the smouldering remains of the fire, a cot was made up for the baby in the parlour. After a time father returned and watched by the baby. When I got back from school for tea I saw only the end of the catastrophe: mother broken down and in tears, the kitchen flooded with water, the charred clothes-horse and cradle, and some burnt clothes. 'But where's baby?' I asked anxiously. 'Hush!' said mother, sobbing; 'he is in there with papa.' Father sat up all night with the baby and in the early morning the end came.

Mother could stay no longer. She had lost her two youngest there, and the place became hateful to her. Fortunately a post fell vacant at the Domestic Mission, Lawrence Street, Birmingham;

the Missionary. Mr Wilson, had just died after many years of faithful service. The fundamental purpose was the same as at Leicester, and the same methods could be used; father applied for the post and got it. On July 31st, 1882, we left Leicester and took up our abode at Birmingham.

We were now better off; father's salary was £200 a year and we were reduced to three children. Our house in Vauxhall Road, No. 105, pleased us children because it backed on to an enclosure where our landlord, Mr Hands the engineer, kept his big wooden moulds on which he kindly allowed us to scramble provided we did not knock them about. And although our own back yard was very small it had an outdoor tank on which we could sail boats.

The inside equally well suited our parents. A spare back bedroom gave father the separate study he had always wanted. He had a passion for books and would spend hours ransacking second-hand book shops, nearly always bringing back something good but rarely spending more than sixpence. At Sheffield he had acquired a nucleus of scientific books, many of them new, purchased with the fees earned at the Mechanics Institute; at Leicester he could add only few, but here was a whole room in which to spread himself. So he fixed up shelves, mostly of his own make, arranged his books, set out on the top his electrical apparatus, and on the mantelpiece he put the skull picked up at Leicester when the Abbey grounds were being cleared. The table stood in front of the window so that as he wrote he could look out on the solitary tree; as we first saw it on August 1st, 1882, it was full of leaf and a pleasant sight.

Mother greatly liked the house. The parlour was larger than in King Street; the woodwork had the maple graining she had so much desired, and the flowered wallpaper was deemed to set off well our art treasures, two vases and modest engravings of Landseer's 'Highland Glen' and 'Stag at bay'. The sofa and chairs covered with black horsehair and provided with antimacassars stood round the walls, the centre was taken up with a large round table on which stood some nicely bound but never opened books; in one corner was the 'whatnot', a flimsy triangular structure holding a few china ornaments; and in another was the small three-legged work-box table on which stood the album of

family photographs which all visitors had, *de rigueur*, to inspect in detail, listening patiently to full accounts of each person therein portrayed.

Father and mother started nappily enough. The Lawrence Street Mission was linked with the Church of the Messiah in Broad Street of which Dr Crosskey was Minister. Those members of the Church who took an interest in the mission were extremely kind to us; to the end of her life mother spoke gratefully of Mr Sydney Lee.

At first I was sent to the Windsor Street Board School, I suspect on 'leftist' grounds. But I did not like it at all. The boys were rough and very addicted to the habit, then common, of 'slogging', i.e. pelting each other with stones that abounded in the streets and playground. The classes were large, noisy, and smelly, the teachers remote. After some weeks the end came. There had been a large scale 'slog' in the playground and as I refused to be pressed into the service of either side a boy threw a stone at me and cut my head open. I got home with much blood on my head and face; mother put her foot down: I was to leave forthwith. Herbert Wilson, son of my father's predecessor, went to Saltley College School, and I should go too. So my father saw Mr H. I. Hobbiss, the Head Master, and liked him very much. I entered in January 1888 and was put in the Fourth Standard; I was rather on the old side (10) but my schooling, it had to be admitted, had been broken.

Saltley was then a village and the school was surrounded by fields. It was attached to the Training College as a 'Practising School': it had its own staff but students would come in from time to time to 'practise' on us. The boys came from considerable distances, and as transport was none too easy, there was no possibility of going home to lunch. Mother usually gave me a good jam paste which I thoroughly enjoyed, and when they were available, an apple also. At first there was some bullying; a great fellow would round up us little boys as 'prisoners', shut us up in the very smelly privies, and watch to see that we did not come out. There we had to eat our lunch. But one little lad was made horribly sick: an inquiry followed, our jailor 'left', and the bullying ceased, never to be resumed.

Thenceforward life at the school became very pleasant. The

boys were thoroughly nice, clean and healthy minded; I never heard any smutty talk or any suggestion of vicious practices. One of my class-mates, Charles Rann Kennedy, grandson of the Greek scholar, became a well-known playwright. The teachers were friendly; they liked us and we liked them; moreover they knew us all by name. No questions of discipline ever arose, there were no severe canings such as were given in other schools; indeed our only trouble was with an occasional student from the College who did not understand this kind of atmosphere and made himself a nuisance. From time to time new methods of teaching would be tried and either developed or dropped, as for example a reading lesson where we were formed into groups of five, each member of which had to read in his turn to the other four; it was abandoned because we spent most of the time talking: I knew Grimm's Tales almost by heart and would retail them with suitable extensions to my group. There was nothing cranky about the school, and we were given a thorough grounding in reading, writing, arithmetic, history and geography. Later French was added, but as no one knew how to pronounce it we got into difficulties and soon gave up the unequal struggle.

There was a great spirit of *camaraderie* between our teachers and ourselves. On one occasion a scripture examination was to be held by the diocesan inspector. We were sent out into the playground while he wrote his questions on the blackboard. Our teacher saw the list and saw, too, that one of the questions was entirely new to us. Of course he could not allow us to be put upon in that way, so he came out, called us together, explained that it was unfair to ask us a question we hadn't been taught and therefore couldn't know, and forthwith told us the answer. The result pleased everyone.

Our games were few and simple and much the same as my own children played later on: Prisoner's Den, Back-ee, etc. We rarely saw newspapers, but we knew something about what was going on. Of course we were well up in cricket news, and could relate exploits of W. G. Grace, Spofforth and others; we knew nothing of football, however. The big political figures were familiar to us and their sayings would go round the school: we were thrilled with Randolph Churchill's phrase 'the exuberance of his own verbosity'. Things were always happening: a gigantic

'slog' somewhere, or a new exploit of 'Springheeled Jack'. None of us had ever seen this person, but several boys had friends whose friends knew someone who had been up against him: we none of us doubted his reality. He derived his name from some powerful springs in the heels of his boots which enabled him easily to jump over a wall, or, if need be, even a house, so that the police could never catch him. And, of course, we all admired Vesta Tilley, the principal boy in the pantomime, whose performances lasted from December to March so that we all had a chance of seeing her.

School ended at 3.30 but the day's work was not yet over. We had about an hour's homework to do, and this must be written neatly in the exercise book: first your name, then the date, then a text; usually we chose 'God is Love' for its brevity, its comprehensibility, and its incontrovertibility. Then came the various subjects. Each main heading had to be underlined with two lines, red if possible, each sub-heading with one line. Neatness was essential.

Father was very happy in his work. His daily routine was simple. In the morning he went first to the Library to see the paper, then he returned to work in his study; in the afternoon he would go visiting, often calling at some second-hand bookshop; in the evening he either worked at home or went to some meeting. He became a Liberal in politics and as great an admirer of Gladstone as my mother was of John Bright. He once took me to a demonstration in favour of extending the franchise; we walked, each wearing a medal, in a long procession to a Park where a well-known politician was speaking; at the end I was rewarded with a bun and a mug of tea, but it seemed inadequate so I never demonstrated again.

Father's committee were well satisfied with him and finally there came an honour that completely dazzled us: he and mother were invited to lunch with a wealthy lady at Edgbaston. No words of mine can possibly convey our sense of the awesomeness of this invitation. Edgbaston! the home of the Great Ones of the City, about whose way of life we, the Small Ones, knew nothing in those days. A missionary friend had earlier received a similar luncheon invitation and, wishing to be correct, had worn somebody's discarded evening dress-suit which had been sent to him

with other old clothes for distribution. But this turned out to be wrong so he returned home very crestfallen. My parents donned their best clothes and went forth courageously. They came back glowing with satisfaction. Everything had gone well. Mother was especially gratified that the dish of tomatoes in the centre of the table, a complete novelty to her, remained untouched, because, she said, no one knew how to eat them. So she came home feeling that these Great People were not, after all, so very different from herself.

As I got home from school soon after four and had only about an hour's homework I had ample time to read in father's study. He had a considerable collection of 18th and early 19th century writers, and I read some of these; *Gulliver's Travels*, *Roderick Random*, *Charles O'Malley*, *Valentine Vox*, *Pamela*. From the school library I borrowed the books boys were then expected to read: *Robinson Crusoe*, *Swiss Family Robinson*, *Two Years before the Mast*, *The Schonberg Chronicles*, *Sandford and Merton*, *The Last of the Mohicans*, *From Log Cabin to White House*, *Eric or Little by Little*, *Tom Brown's School-days*, etc. I did not confine myself to fiction, but read Robert Ball's *Astronomy*, and would go out in the evening and sit on the wall picking out the constellations from his charts; also I read some botany, and in my diary made lists of flowers and their natural orders, though 'giliva' (wallflower or Gillyflower) and 'Piennies' nearly defeated me.

Father never let us miss an opportunity to learn something; he would take us to the gasworks on the occasion of the annual inspection organized by the Corporation, or to the Museum or Library. I became very fond of music, and would spend hours practising hymn tunes or pieces out of 'The Musical Budget' on our harmonium or on one of the collection of derelict instruments which somehow had found their way to the Mission. Father started a weeknight service for which the organist was unable or unwilling to turn up, so I proudly played the harmonium for it. I most devoutly wanted to learn the piano and the organ, and begged for lessons; there were then many teachers of the piano with neat plates on their doors announcing their readiness to receive pupils: a usual charge was half a guinea a quarter for one lesson a week. But unfortunately the income did

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not allow of this, so I remained to my great regret always untaught.

Christmas was a great festival in our home and it coincided with our parents' wedding day. They bought us handsome presents besides the things we always found in our stockings—duly hung up for Santa Claus to fill. One year we tried to play our part: inspired by a picture on a Christmas card, which had greatly appealed to us, we secretly practised carols by the light of a penny tin lantern after we had gone to bed, and then on Christmas morning stole into our parents' bedroom and started to sing. But things did not happen as on the Christmas card; we were chased back to bed with a slipper and told to lie there quietly till morning.

At Birmingham we had the only two seaside summer holidays of our childhood. The Railway Company started seventeen day excursions to various places at cheap rates and we went to Weymouth in the summer of 1883 and to Bournemouth in 1884. I still have my Weymouth diary. It records that we paddled, bathed, built castles, or scrambled about the 'Layers Clay' for 'Shells of the *Austero Gigantica*, a fish looking very much like an oyster that used to live in Layers Clay of which there are now no remains except the shells'. Several days were spent on Portland, and I especially enjoyed the scramble my father and I took round the coast. It was the first time I had ever seen cliffs and neither of us had any idea of height or depth. I was enormously impressed: 'we went round a corner and saw a chasm about 200 or 300 feet deep with a high dark rock on the one side, the rather low rock that we stood on and a spring about 200 feet above us though it did not play. We did not dare to stand and look over (the chasm) so we lay down (to look). . . . Few can imagine that grand scene, the high dark rocks, the deep chasm, the dark blue sky and the roar of the sea.' . . . So the diary goes on. A later visit showed that the figures were all wrong and showed, too, how widely different a thing looks to a boy of ten from what it does to a man of fifty.

We had only one other holiday away from home as children. In 1885 father took three of us for a few days to Kinver Edge at the invitation of a kind hostess, but mother was left at home with the baby. Expenses were beginning to mount up and as always

mother had to do the economizing. So she dispensed with the maid, thereby saving the wage of £8 per annum and her keep, and she used to add her breakages, and somehow kept things going normally.

I was now nearly thirteen years old, the age at which most boys of my acquaintance would leave school. I must soon decide how I was going to earn my living. At thirteen father had already chosen the teaching career and become a pupil-teacher. What was I going to do? Unfortunately I didn't know and it made me very sad. Nearly all the boys in my class had quite definitely chosen their future occupation: the majority would follow their fathers. I did not want to do this nor did my father recommend it, but I could think of no alternative. Father always considered that we should choose our own careers; he would help as far as possible, but as I was the eldest he could do very little for me. I would, of course, have liked to go to the King Edward VI Grammar School, but that was out of the question.

Just then the Birmingham Education Authority decided to open a Technical School to train the new artisans who were displacing the old craftsmen. Science was henceforward to be the basis instead of empiricism, and the Technical School would, it was hoped, greatly strengthen and shorten the apprenticeship.

Father satisfied himself about the school and in September 1885 sent me there. It was a converted factory in Bridge Street, Broad Street, and the fee was only fourpence a week.

Had the Education Authority kept strictly to their purpose of training artisans I should have benefited little by the change. Fortunately English educational institutions are rarely entirely logical or consistent. The Government Grant, or part of it, came through the Department of Science and Art of South Kensington and was based on the number of Passes, and especially of First Class Passes, in the examinations held each May. At all costs, therefore, these examinations had to be passed: the elementary in the first year and the advanced in the second. They were frankly scientific and had no relation to technology. While therefore we had a carpenter's shop where we put in an hour a week under a very kindly craftsman, and while we had a very occasional and none too lucid talk on some technological subject such

as dry rot, practically the whole of our time and effort went into preparing for the May examinations. In the first year we took four subjects: Model Geometry, Mathematics, Theoretical Chemistry, and Practical Chemistry, but no Biology; that of course had nothing to do with industry. Our teacher was E. J. Kitson, who had a great gift for expounding chemistry and a considerable repertory of striking lecture experiments. Our practical work was extremely simple, consisting in very elementary qualitative analysis of simple salts by the so-called 'dry way' and the 'wet way'. We lacked appliances even for the simplest preparations, but father allowed me to buy a few things for myself so that I might practise at home. I became wildly enthusiastic and made rapid progress: in an early test by some outside authority I was easily first with 99 marks out of 100, and with the sardonic humour some schoolmasters possess, I was given a mock reprimand by the Headmaster before the whole class for having lost the last mark. 'Where is that mark?' he said, fiercely; and the boys did not know whether it was a joke at which they ought to laugh or a reprimand at which they ought to appear properly shocked. During the Christmas holidays I revelled in Roscoe's and Thorpe's little books on chemistry. In the May examinations I got First Class Certificates in all four subjects; this made me quite a useful grant earner for the school.

In the second year we had the same subjects but took the Advanced Course. We were equally fortunate in our teacher, Mr Hill, who taught mathematics very well and was always called 'Minus'. Like Mr Kitson, he aimed at educating us and not merely getting us through the examination, and he made me just as keen on algebra and trigonometry as Mr Kitson had on chemistry.

The school had its drawbacks; the boys were of a poor type and there was an atmosphere of dirty talk and vicious practices such as we had not had at Saltley. But it enabled me quite definitely to decide my career: I would be a scientist, a chemist by choice. The chance seemed to come when Professor Tilden of the Mason College Chemistry Department sent to the Technical School for a laboratory boy. Here, I thought, was the ideal place for me, so I put in for the job. But I was turned down in favour of a bigger boy. It was my first disappointment and one of the

saddest in my life. Then another chance seemed to open up. The Education Authority was offering one or more scholarships; I never quite knew where to, but a scholarship would give the opportunity of further study. An indispensable condition, however, was that the candidate must have a First Class South Kensington certificate for Elementary Freehand Drawing. This practically excluded all but the Board School Boys, for they alone had taken the South Kensington examination. There was the shadow of a hope that by joining an evening class at the Art School I might get the certificate, but time was extremely short. I tried but failed.

All further possibilities were soon ruled out because father decided to leave Birmingham. There had been some trouble at the Mission and he would stay no longer in spite of the good work he had done there. Unfortunately, too, we had been living beyond our income; when the accounts were made up we were £100 short, and this had to be raised forthwith. Father went to London, borrowed £50 from his mother and £50 from Uncle James. He paid all his accounts but the next stage of our family life began with a heavy debt, a situation my mother had always tried to avoid: 'Pay as you go' had been her motto.

Father was invited to the Stratford Unitarian Church, West Ham Lane. The salary was £160 per annum, with the monthly collection each alternate month. The house was going to cost us more, and mother feared that all living expenses would be higher. 'You want jewels and diamonds to live comfortably in London,' she said, almost in tears; we had neither. Her fears and anxieties affected us, and we were a very sad family. Father tried to cheer us up, spoke in praise of London and its possibilities, but we always took our mother's view. The future looked gloomy.

The family left in March 1887. At the urgent request of the Headmaster I stayed on at school to take the May examinations; he pointed out that I was safe for three or four First Classes and these being in the Advanced Course would bring *budots* and grants to the school. Father had too much of the professional spirit to remain unmoved by this argument and so I was left behind. When I saw the family off at New Street Station, and they saw me standing solitary on the platform, we all felt that a chapter in our family history was ended.

I lodged with a Scottish engineer, the father of one of my school friends, Alec Campbell. He and his wife treated me with the utmost kindness which I have never forgotten. They had four children of their own and only a small house, but they fitted me in; boys never mind a squash if there is food and kindness. We slept three in a bed, but the eldest, Peter, who was destined for the Church as not unusual in Scottish families then, had a little bed of his own in our room. Each evening there was Bible reading and prayers. On Sunday morning we walked to the Scotch Presbyterian Church in Broad Street. The family had great respect for the elders, and we always dawdled on the way out hoping that one of them would catch us up and speak to us. The services were austere and the sermons long, and to a southerner dull, though Mr and Mrs Campbell often found in them material for improving conversation at the dinner table when we got home. Then after dinner we were allowed to go for a walk, though with the intimation that this would not have been permitted to Mr and Mrs Campbell in their childhood.

I stayed till the May examinations were over, got four firsts and so made my contribution to the school *kudos* and grants, received as prizes a pile of books which I had myself selected, but quite unsuitably. I could not understand them so they remained unread, but I carried them with me throughout my life's pilgrimage till in the great upheaval in 1943 my wife sent them as salvage, where we hope they finally served a useful purpose as raw material for munitions.

CHAPTER I

Earning My Living in the City

1887-1890

I rejoined the family in June 1887 in their little house in Japsen Road, Stratford, E. (later 'blitzed') just in time for the celebrations of Queen Victoria's Jubilee. On the evening of the great day father and I walked through Stratford, Bow, Mile End, Aldgate, the City, the Mall to Buckingham Palace to see the illuminations and then walked home to describe them to mother. She was already settling down, but found the quarters narrow and the work hard. There was an inauspicious start when we bought a loaf of bread from a near-by cellar bakery and found a dead mouse in the middle. But gradually she discovered the trustworthy shops and adapted herself to her new and harder life.

For me, however, the question of finding work was pressing. I was well turned fourteen, and it was high time to be earning money to add to the family's very slender resources. I was full of desire to study chemistry but saw no hope whatever of doing so. Thinking that chemistry was practised in chemists' shops I decided to try to get into one, and save up money to go to college. Father wrote to various influential Unitarians asking for employment for me; one of them, Mr James Epps, invited us up for interview at his shop in 48 Threadneedle Street. There father and I met him and his manager, Mr Thomas Doughty, and I was duly appointed at seven shillings per week. I turned up on the following Monday at 9 a.m. wearing a low crowned 'billy-cock' hat (ancestor of the 'bowler') purchased at Lewis's for 2s. 6d. but also knickers, as we could not afford to buy trousers. The hours were 9 a.m. to 7 p.m. with a break for lunch from 2 p.m. to 3 p.m. On Saturdays we closed at 6 p.m., but as the half holiday was becoming more and more common there was practically no business done after 2 p.m. Mr Doughty proved that the cost

of gas burned was greater than the money taken, but Mr Epps would not lightly give up the old ways; he compromised, however, and let half of us go at 4 p.m. each alternate Saturday.

To my intense disappointment no chemistry was done in the shop, nor did any of the assistants know anything about it. We were homoeopathic chemists, Mr Burchell upstairs macerated various roots or leaves that were purchased from wholesale houses; it was a very simple operation carried out in accordance with the pharmacopoeia instructions. Mr Doughty made the dilutions from the 'Mother tincture': first 1 in 10, then 1 in 100, then 1 in 1000 and so to 1 in 1 million which was our common strength, and this tincture might then be used as such or absorbed on to pillules of milk sugar, also supplied by the wholesalers. But I was told it would be long before I reached that stage, and meanwhile I had to label the bottles of pills which Walter Field had filled, put each into a little round case, and label it. It was dreary work and Mr Doughty, seeing my disillusionment, varied my task by sending me on errands or on messages. I was not, however, the errand boy: that post appertained to Henry, called the 'yob', it being considered humorous to invert words; this was also said to be thieves' slang. The distinctions between us were subtle but fundamental: he carried his packages in a sack on his back while I carried mine in a black handbag; he swept the shop while I dusted it. But these journeys gave me an intimate knowledge of the city, its alleys and short cuts and the adjacent districts. There were no tubes; bus routes were chiefly along the main roads, and many of the journeys had to be made on foot.

Like many of the offices of that time our shop had been a house; just outside in Capel Court the remains of the old cesspit had recently been found. The older business men could remember the time when people had lived above their businesses. Now, however, they lived well away; opulent stockbrokers even as far as Brighton. Very prosperous men had their own private hansom cabs. London was very attractive especially on a sunny day. The streets of the city were packed with traffic from about 10 to 6, and many were cobbled for convenience of the horses; the carts and buses rumbling along on iron tyres (rubber had not yet come in) made very considerable noise. There were

neither motors nor cycles. Farm carts and waggons brought in hay and straw for London horsekeepers and fodder for London cowkeepers, of whom there were many; and they took back stable manure. The horses used to foul the streets badly and an army of scarlet coated boys slithered along bending down to the ground with a brush and a large dustpan sweeping up the excrements, and depositing them in a tall rectangular box about the size of a pillar box. At certain places there was a crossing sweeper who, having swept a path across the road, stood on the pavement to receive the gratuities of passers-by. In spite of all efforts the streets were dirty, and numerous boys set up as 'shoe blacks'; some did pretty well.

The streets were narrow, the horses added greatly to the length of the carts and the buses, and traffic jams were frequent in the city. There was little regulation, and as the head of each horse almost touched the tail of the vehicle in front one had to acquire the knack of gently pushing the horse's head to one side so that one might pass to cross the road.

The bus rides were very entertaining. You clambered up the fixed iron ladder to the top and sat on the long 'knife edge' seats which ran along the middle back to back, one facing each side of the bus. There was also a seat each side of the driver which was a special joy because he would talk to you if he felt inclined and in any case he would abuse the drivers of other vehicles, making unfavourable comments on their management of their horses, their parentage, etc. Boys were not encouraged to mount these seats, however; a 'swell' was better, and he might offer the driver a cigar. Women and girls could not get on top at all. The streets were full of life and incident, and boys would run alongside the bus, turning cart wheels and asking for a penny as a reward.

I shall never forget that first winter. The shop was entirely unheated, the only fire was in Mr Burchell's room to which no one but Mr Doughty was allowed access; the rest of us had only the fish-tail gas jets to give light and heat. To make matters worse we had, as mother had feared, lighted on hard times at home. The monthly salary cheque was often late in coming, the honorary treasurer being very forgetful; the bi-monthly collection was very small; father had promised to repay his debt 24

monthly, and one of his sisters was in financial difficulties and appealed to him so he helped her. Mother was almost distracted. There were now five children. Her house-keeping allowance was 25s. weekly, but a good deal of this would at times go to the distressed aunt who would promise to repay before the end of the month but frequently was unable to do so. My boots leaked, I had no overcoat and on a rainy or snowy day would arrive at the shop wet and cold and sit in that cold place shivering. My cough became bad and I was a nuisance to my fellows and a very poor advertisement for the firm's wares. As always mother came to the rescue. She dismissed the day-a-week woman, did the washing herself, and obtained the necessary garments.

That, however, did not end my troubles for much of each day I was hungry. Breakfast was over by 8.10 and had been on the meagre side; dinner at 2.15 began well at Uncle James' coffee house, but soon I was reduced to doing the best I could for sixpence, or more usually fourpence. For sixpence I could get a three course meal at a vegetarian restaurant; for fourpence I would buy a pennyworth of bread, $1\frac{1}{2}d.$ worth of butter, $1d.$ or $1\frac{1}{2}d.$ would go on an apple as long as they lasted: then I would adjourn to the quay in front of the Custom House next to Billingsgate Market, at that time open to the public, and I would sit down and eat my frugal meal. Then there was nothing more till after 8 when mother would have a meal for me. It was an unhealthy life, and I became a very spotty, coughing, unattractive youth.

The mid-day meal was a difficulty for all of the staff and it would have been quite improper to ask anyone how or where he had lunched. We all went our separate ways, disappearing from each other's sight round corners. Lyons had not yet started; the only place within our means was Lockhart's who had a number of shops: but these, being patronized by van drivers and lorry boys, were not for us. The City magnates, of course, went to the chophouses, to Pimm's or Simpson's or other such places; but none of us even pretended to do that. Mr Doughty went to one of the houses then starting to give a set meal for one shilling, but his income was six pounds weekly while the best of the assistants got only £2 2s. (guineas were of course more professional than pounds). Walter Field, my immediate head, in

an expansive moment confided in me that you could get a very satisfying meal by going to the counter of one of the good confectioner restaurants and buying two-pennyworth of 'pieces': broken buns, stale rolls, fag ends of cakes, etc.

That need to conceal poverty as something indecent added to the difficulties of the clerks and professional assistants among whom we ranked ourselves. Most clerks, and our seniors, had to wear a black coat and a tall hat which periodically wanted ironing at anything from 2d. to 6d. a time; umbrellas were neatly folded, the art being well understood. Few had more than £2 2s. weekly and many had less, but they liked to give the impression of having private resources, and working rather out of the desire to be doing something or of supplementing their private income, than from any vulgar necessity to earn a living. All wore moustaches, the smart ones had in addition an eyeglass and pronounced their r's as w's.

Of course they were not all like this. One of our assistants of Irish origin refused to make any such pretences: quite openly he told us that, when he got home at night he took off his coat and his boots, ate the supper his wife provided, sipped the pint of beer fetched for him from the corner public house, smoked his pipe and read the new evening paper, the *Star*. But he lived at Upton Park, where no doubt such things were done, and anyway he was later dropped at short notice and we never heard of him again. It was a shock to me because I had not till then realized that business organizations could discard people in that way.

The volume of business was much less then than later but there were no typewriters and everything was done by hand. This meant of course that handwriting became a fine art and in almost every street there dwelt a Professor of Calligraphy, who exhibited samples of his skill in a glass case outside his door, and for a modest fee would teach his clients how to make the same wonderful letters and flourishes. All the clerks were men, there were no women in the offices, banks or shops other than ladies' shops, though there were some in the warehouses.

Life at Epps' was unhurried and had its moments of relief. At 11 a.m. Peachey the postman would bring in our second mail, and Mr Dougherty would descend from his stool and go to have a

little chat with him. Morning and afternoon a barrel organ would come along and play us 'The Lost Chord', 'I dreamt that I dwelt in marble halls', 'Call me back again' and other favourites; then, having exhausted its repertory and collected its tribute, it would move farther down the street to entertain a different *clientèle*.

But I was not happy. The cold, hunger and discomfort did not worry me; what did distress me was the feeling that I was in a cage out of which there was no escape. My wages rose annually by two shillings a week: by the time I was thirty-two I might with luck be getting £2 2s. weekly and no more. And the work was so deadly dull; there was no chemistry in it, no science of any kind. I most passionately wanted to get out of it into something that offered more scope for my earnest desire to be doing scientific work.

Father's suggestion was night classes. He had great faith in South Kensington certificates and believed that if I had enough of them I should be a made man. He would tell me about men who had got fifteen or twenty certificates and who became Whitworth scholars; it was not too difficult as with a little ingenuity you could select three subjects that between them almost covered the ground of a fourth. At Stratford we had a Mechanics Institute but the only science class beginning at 8.30—the earliest hour I could attend, if I was to have a meal—was one on elementary Sound, Light and Heat. I took this but it did not help much; there were very few experiments, no practical work and we were simply given a few facts and formulae. I went on with my desultory reading; on my four o'clock Saturday afternoon I would go to the Guildhall Library and read till six; I got through Grove's *Correlation of the Physical Forces* which father recommended, and Bain's *Emotions and the Intellect*; in the train I read Tyndall's *Forms of Water and Heat a mode of Motion*, also Carlyle's *Past and Present* which greatly appealed to me and was one of the big formative influences in my life because of his insistence on the importance of work. Three times a week or more I had to wait half an hour in Dr Burnett's waiting room for prescriptions which we afterwards made up; there I found and read Bolingbroke's *Essays* and Oliver Wendell Holmes' *Professor at the Breakfast Table*. At home in the evenings I read

the *Pickwick Papers* with intense enjoyment, but having finished it I reluctantly put Dickens aside, hoping always however to come back, which I did in better days. I worked through Potts' *Euclid* and Simpson's *Algebra*, text books that were old even in father's college days, but they were the best we knew. Also I continued the shorthand which I had begun at Lawrence Street, transcribing much of the *Vicar of Wakefield*.

In the second year I attended the City of London College, White Street, Moorfields, and took a class in Latin so that I might pass the Students' Examination of the Pharmaceutical Society, which would open the way to the Minor and then to the Major examination of that body. Stories floated round the shop about an earlier assistant who had passed the Minor, been appointed manager of a chemists' shop in the country, had married a relative of Mr Doughty and was getting £4 a week. If this was the reward of the 'Minor' what vistas might the 'Major' not open up! I sat for and passed the Students' Examination and was complimented by Mr Epps, who told me that not too many men were qualified, and that there was always room at the top.

Another class I took, at first because it was free to students, afterwards out of sheer interest; Sydney Webb's lectures on Political Economy; a revelation to me of the art of exposition. I was fascinated by his clear cut style, his wealth of knowledge and the orderliness of his presentation. He gave us the classical material and then spoke on Socialism: when I asked him what the world would be like under Socialism he directed me to Bellamy's recently published *Looking Backward*, which fortunately father possessed. He did not finish the course, being called off to the United States; his deputy was Harold Cox who put us straight on to Marshall's little book which I greatly enjoyed. In the examination that followed I came out top and won the prize given by the Cobden Club: more books, again chosen by myself, and again unsuitable and so unread. I chose four volumes by Max Müller (*Lectures on the Science of Language* and *Essays*) on the strength of a very eloquent address I heard him give at the Guildhall, John Stuart Mill's *System of Logic*, because I thought I ought to know something about logic and I had enjoyed his *Essay on Liberty*; and others less famous. These

two successes greatly cheered me and I felt that evening classes might help me out of my difficulties.

Perhaps the most important factor in my life at this time was my father's church. It was not simply a place of worship, it was our social club and the centre of all that part of our lives that was not concerned with earning our living. It had been established some thirty years earlier when Stratford and West Ham were villages surrounded by fields. When we arrived the district was built up, but its character was changing and this affected the congregation. Stratford and West Ham were becoming more and more working class districts, while the blackcoated classes moved farther out. Our congregation at West Ham included both groups, but it was rather a strain for the distant people to come in on Sunday mornings, and after a somewhat uneasy partnership the Forest Gate and Manor Park Group left us and started their own church. This made our church more homogeneous and easier to work; a small professional group, however, remained—the Shutes, the Noels, and a few others—to whom I owe more than I can say.

Most of our people had ability and character, and many of them felt that they deserved something better than the subordinate and prospectless positions in life which had fallen to their lot. Part of the value of the chapel to them was that there they became people of consequence, members of the committee, or officers of the church; there was no sense of frustration and they could live for an hour in complete independence; they could, indeed, even enjoy a sense of power. During the week our Sunday School Superintendent was a school teacher, but only an assistant working under an unsympathetic head and with the constant feeling of repression. Our Sunday School was a great relief to him. Here he was Head: his word was law, and the teachers were definitely under him. He would march down West Ham Lane in tall hat and frock-coat carrying his umbrella rifle fashion on his shoulder, with his small beard combed and a look of pride in his eyes; for an hour his inhibitions and repressions were lifted and he had the position he felt he deserved.

We used to have some very nice Saturday evening parties. There was plenty of serious conversation, sometimes on scientific subjects which were then being popularized: Vivian Lewes

gave us some experimental lectures on Flame at the Town Hall which kept us going for weeks; or we would discuss phrenology or spiritualism, or some sermon which someone had heard at a London Church: 'the best I had ever heard', was one comment; 'I could hardly understand a word of it'. Of course we didn't accept everything proffered to us: a minor Civil Servant born in the West Country but deeply interested in astronomy and geology had definite views about one of the Western formations which he had put before the professional geologists but which they, to their discredit, completely ignored. Sport never came into our conversation, and politics were usually excluded, nor did we talk of ordinary crimes, although we had all seen in the shop windows vivid pictures in the *Police News*. We saw *Punch* in the library, and in the shop windows another comic journal, *Aly Sloper*. We younger people would have long arguments about some definite topic such as 'Is smoking bad for you?' or more often one of those rambling discussions that start from no particular premises and end with no particular conclusions. The women folk would usually bring some sewing or darning and would talk 'shop'. On the lighter side the daughter of the house would play the piano and sing to us: all our young ladies had 'accomplishments'. A young man had to walk warily: one of our number who showed what looked like special interest was invited to a private talk with 'papa', who asked him what his intentions were. We did not approve of dancing. Over a simple meal (which often included some of the daughter's rock cakes) there would be much joking, one of the popular forms being a pretence by each man that he was master in his own house, and that his wife fully accepted that position. Their wives would smile and say little, though we would sometimes tremble at the boldness of some of the menfolk, for we knew, and they knew, and as Mrs Gaskell put it, they knew that we knew, that there would be a settlement later. Meek, insipid women of the nineteenth century, indeed! I never met them! But they were proud of their men folk, and liked to see them turned out on Sunday well groomed, in tall hats and frockcoats, and while hoping their children would go farther than they had done would nevertheless say: 'Papa hasn't done too badly, after all.'

We very rarely went to the theatre: there was none at Strat-

ford and it meant a journey to London which was very tiring and we hadn't the money. Once father scraped together enough to take me to see Wilson Barrett in the 'Lights of London', a sentimental play of the kind we deeply loved, but to my regret I could never see Henry Irving or Ellen Terry or any of the great actors. People of our class could not go to Music Halls. We heard the popular tunes on the barrel organs or played by the 'German bands' and we generally knew at least the first verse of special favourites such as 'I dreamt that I dwelt in marble halls', 'Queen of my Heart', 'Call me back again', or 'Ora pro nobis'. Father was the only one of us who regularly saw a newspaper and he would tell us the events of the day, so that we could keep our end up when the conversation turned on them. We got details of Jack the Ripper's exploits while they lasted, and later of the Parnell Commission, also of the sugar bounties which adversely affected our West Indian sugar producers but also encouraged our jam and biscuit makers so that we could never decide whether they were good or bad. The conditions of the time greatly stimulated the development of individuality; there was as yet none of the canalization of taste and opinion imposed later on by the popular Press and entertainment organizations. Each district had its distinctive characteristics and usually its dialect. Each individual could develop pretty well as he pleased so long as he did no harm to his neighbours.

My father's broad sympathies attracted a number of the eccentrics who then abounded, and they would come to our house though not to the church. One impressed my mother greatly because (so he said) he drank nothing but cold water and ate nothing but wheat grains and apples which he always carried in his pockets, so that in his household there was no cooking, no laying of meals or clearing away, and no washing up, at least not on his account.

There was little going on in the week at the church, the idea of an Institutional Church not having come our way. Our busy day was Sunday. School at 10 a.m. was attended mostly by little children whom mothers were glad to have out of the way while they prepared the dinner. Father and I were sometimes the only staff. Service was at 11 a.m., the elder scholars went in to this but the younger ones remained behind for a time in my charge;

I became devotedly fond of these children, and remained so all my life. I used to tell them fairy tales adapted from Hans Andersen or Grimm or invented for the occasion. After dismissing them I went into the church. Some of father's sermons impressed me greatly. He had of course got right away from the emotional appeal of the Tabernacle days; his was a religion of work, not for self-enrichment, but for the general good, and inspired always by the spirit and faith of Christianity. 'Man, work out thine own salvation' was a favourite theme; and he never tired of quoting the monk's prayer: '*Laborare est orare*'. This appealed to me very much, as did a passage in Carlyle's *Past and Present* that stuck to me all the days of my life: 'Blessed is he who has found his work; let him ask no other blessedness'. My trouble at the time was that I had not found mine.

We all believed in the progress of mankind upward and onward forever and in a Heaven where the injustices and hardships of this life would be rectified. This widespread certainty of ample compensation for suffering, and the assurance that those who had caused us injury would pay the penalty in full, enabled men and women to go through life cheerfully when they might otherwise have been weighed down by their burdens, and accounted for no small part of the optimism of the nineteenth century.

After the service father would walk to the door of the church to shake hands with people as they went out. Usually, however, no one was in a hurry to go. The congregation was small, we all knew each other and were very friendly, we would stay behind and chat or, in winter, gather round the stove for long pleasant talks until we felt we should not further detain the chapel keeper. I had to be back at 2.30 for I ran the Sunday School savings bank; then I played the harmonium for the opening of the school at 3 p.m. and then taught my class till 4. Then home about 5 for tea. After that in the early period I used to go for a long walk and then come back and settle down to an evening with Pott's *Euclid* or Simpson's *Algebra*, but in the later period I would return to chapel at 6.30.

I was not alone in feeling 'trapped' at Epps, several of the

others did also. One, a vigorous healthy youth, decided to go out to the Rockies in one of the gold rushes. We never heard how he fared but it was said that he died of cold and hunger in the first winter. Another, my immediate senior, Walter, had a flair for acting and had appeared in one of the small theatres in North London. He often tried to get into a company and at last succeeded. With great pride he brought us a circular setting out the details of a tour by Brown's London Company, starting at Aberdeen and going on to various places in the North. There were about twenty members, and their names, including Walter's, were given. They were to start next day by the night train to Aberdeen so were leaving tonight. We gathered round him admiringly and foresaw a brilliant future for him now that he was at last launched on an actor's career. He solemnly recited the lines:

'There is a tide in the affairs of men, which taken at its flood,
leads on to Fortune,

Neglected, all their lives are spent in shallows and in misery'

We shook hands with him and watched him go down Threadneedle Street, feeling that he had taken the tide of fortune at its flood.

A few days later Mr Doughty brought in a newspaper cutting, and read it to us. It was not, as we had hoped, an account of Walter's brilliant success on his first night. There never had been a first night. The whole Company had turned up at King's Cross in time for the train, but Mr Brown did not come. They waited anxiously wondering what had happened. The train departed and still no Mr Brown. Gradually it appeared that he had required each of them to advance £25 towards the initial expenses of the tour to be refunded directly the 'takings' came in. They reported the matter to the police, who made inquiries and caught the man. He was entirely a bogus agent and he lived by defrauding unsuspecting people anxious to go on the stage. He was duly sent to prison.

But Walter never came back. Later we heard that, broken and disillusioned, he had got a job in a tobacconist's shop—a great degradation to our minds—more we never knew.

Getting out of the cage didn't seem to be so easy after all, and

[sometimes] a little envied those of my colleagues who decided to stay in it and make themselves as comfortable as they could.

We had of course the statutory holidays: Christmas and Boxing days, Good Friday and Easter Monday, Whit Monday and August Bank Holiday; on these days I took a long walk carefully planned weeks beforehand with details of route entered in my notebook: the places included Epping, London Colney, Keston Common, then almost a country walk from South Woolwich. London was expanding, but the villages had not yet joined up: Shooters Hill bordered the country; Foots Cray was 'a quiet old village'—to quote my diary—so also was Chelsfield, the road to which lay 'through some lovely woods . . . every now and then a superb view', so that the walks were much more pleasing than they would be now. My colleagues at the shop spent their holidays differently. The single men would go to the seaside: the excursion fare was two and six to near places like Sheerness, four or five shillings to more distant places; the married ones would hire a trap and drive the family out into the country along the Old Kent Road or somewhere that way. Every man of spirit had to be able to drive a trap, and when after the holiday the day's adventures were told it would never have done to admit to a mishap caused by bad driving.

My summer holiday was five days in the first year and an additional day for each year's service up to two weeks, which was the maximum except for Mr Doughty who had three weeks. The first year, 1888, I went to Lancing and explored the region pretty thoroughly; the second year I went for a walking tour with my father round Essex starting from Chelmsford, where my father had preached on the Sunday—where, too, we had seen a hostile crowd 'duck' a Salvation Army captain in a horse trough, but he went on with his service all the same. We went to Mersea Island, worked round the coast as far as Harwich, then by steamer to Ipswich and back along the London Road. Essex was then very depressed: the old corn growing agriculture was gone and dairying was not yet established—we had great difficulty in getting milk—the seaside resorts were as yet only small, and visitors elsewhere very few. We stayed in cottages on Mersea Island and Great Holland (then an isolated hamlet) and saw something of the kindness of the people and of their

great poverty. Agricultural wages were only 9s. per week and for the harvest period a lump sum of £5. The rent of a cottage was £3 10s. per annum for the landlord's workpeople and £5 for others. Each family also had an allotment for growing vegetables. In winter, however, they often had to subsist largely on bread and sugar—fortunately very cheap then because it was bounty fed. Flour was 8s. 6d. per bushel (56 lbs.) in autumn but more in winter, and coal, brought occasionally in small coasting vessels, 22s. per ton—very poor and very dear, so people said. The young children were attractive, but became duller at about fourteen; the older people were clean, friendly and fond of a chat.

Owing to my long hours at Epps' and the absence of any Saturday afternoon holiday I never got the chance of playing games and consequently never wanted to do so; walking was my only form of exercise. I tried bicycling, but quickly gave it up: I bought a 'penny farthing' machine for 2s. 6d., but its solid rubber tyres came off on the slightest provocation and had to be put on again with a special glue. I used to take it into a quiet side street where father would gallantly help me to mount, but I never could be sure of getting on, or of proceeding in any particular direction, or of landing on my feet when I got off. So I sold it for 1s. 3d., and wanted no more cycling.

My third year at Stratford was in many ways my happiest there. I was beginning to lead a healthier life. We moved into a rather better house in Disraeli Road; it had a bathroom—the first we had ever possessed, and, after we left the house, the last for many years. I rose at 6.45 each morning, had a cold bath, and then a half-hour run over Wanstead Flats before breakfast; on Sundays I would go for an hour and a half over the Flats to Manor Park and beyond. For a time I became a vegetarian but my mother never approved of this; when winter came and I got a bad throat father persuaded me to give it up; 'It might be all right in an ideal world but we had to face facts; we lived in a world of practice', he said. So I returned to our normal dietary. Mr Doughty saw that sitting long hours in a cold shop was telling on my health and he lost no opportunity of sending me on errands, sometimes considerable distances. Also he transferred me to the top room where under the very kindly Mr Burchell I made dilutions in powders instead of in tinctures: one

part of the drug had to be ground intimately with nine parts of milk sugar to give 'Dilution 1X', one part of this mixture with a further nine parts of milk sugar to give 'Dilution 2X' (1 in 100) and so on to the usual 1 in 1,000,000 dilution (3X). I was quite clear, however, that this was not to be my future career and was firmly determined to find another though I did not yet know what.

I saw notices of Civil Service examinations and thought I would work for those. Then in the 'Penny box' of a second-hand book shop in Booksellers Row—which used to run between the two churches in the Strand, and got pulled down in making Aldwych and Kingsway—I found an old copy of the University Correspondence College Guide-book to the London University Matriculation examination, and was overjoyed to discover that I could already answer some of the questions. This, then, seemed to be the way of escape: I would work for matriculation, then aim at the B.A. or B.Sc. degree; if I could get this my prospects I thought would be secure.

The evening classes, however, were not very helpful. I could not reach any of them till 7.30 p.m. and most of those I wanted began earlier. In the end I went to the People's Palace, now Queen Mary College, and took Organic Chemistry under A. P. Laurie who had not long come down from Oxford. The class was held on Monday evenings: we began at 7 with a lecture, then from 8 to 10 p.m. did practical work in the laboratory. Mr Doughty kindly let me off at 6.30; the slow horse train was no help but by dint of a good deal of running I got there in time. I had to take half an hour off my lunch time to make up for this concession and at first had to go from 2.30 to 10.45 without food. However, Mr Burchell saw that this was too much, and he allowed me to have some bread and butter at 6, and on the way there I bought a glass of egg and milk so that I was not too hungry to go through the course.

Mr Laurie was the first Oxford man I had ever met and he impressed me greatly. His lectures were almost entirely non-experimental: his chief interest was in the chemical juggling whereby groups could be added to or taken away from an organic compound, but he was turning on to paints and colours. The practical course was an extension of the wet- and dry-way test-

ing that then constituted Practical Inorganic Chemistry; it consisted in testing for simple compounds: acetic, oxalic, succinic acids, etc.; there were no preparations as done nowadays. It gave the teachers no scope and aroused no enthusiasm among the students, but it was the course laid down by the South Kensington Authorities who dominated the scientific instruction of the country.

Mr Laurie did not stay long. There was some trouble which I never fathomed and he left. The students organized a meeting of protest. Mother and I discussed the question whether I should attend; her first reaction was that I should keep out of trouble; then she relented: 'Perhaps they won't pay him his salary', she said; so I went. We met in a little coffee house in the Mile End Road and subscribed sixpence each to the cost; there were about a dozen of us but as we knew nothing except that Mr Laurie was going there was nothing we could usefully do. So we all went home. He was succeeded by D. S. McNair, a very conscientious teacher who afterwards went to the Glasgow district as Board of Education Inspector.

Meantime father had taken up a certain amount of public work and had been elected a member of the School Board; he was also interested in the Co-operative and the Temperance movements, both of which were strong in Stratford; though neither he nor we ever wore the blue ribbon—the sign of the pledge of total abstinence. But the West Ham Lane Church was not developing and he was becoming anxious about the future. Mother too was finding life very hard at Stratford, and the constant struggle to make both ends meet was intensified after the birth of my younger sister, her ninth child of whom seven were at home. I was the only one earning, and from my eleven shillings weekly had to be deducted five shillings for my week's travel, lunches and pocket money. I carried an emergency shilling in my pocket, so that I should never be in the embarrassing position of being caught without money in some situation of desperate need, but as I also had the strictest injunction never to spend it, its value was psychological rather than practical.

And then quite suddenly the way out appeared. Father was invited to take charge of the Unitarian Church at Pudsey in the West Riding. The salary was no more than in London, but the

cost of living would be less. He would like the work better and it would give him more scope. He decided to go, and mother was greatly relieved.

It was well that father was leaving Stratford. He had become very depressed through no fault of the people at the chapel but simply because he was attempting an impossible task. He had hoped to combine the office of minister with a good deal of public activity, and had been an enthusiastic member of the Radical Club, speaking vigorously at their meetings. Radicals were then the extreme 'leftists'. This offended some of the more attractive members of the congregation, which greatly distressed father: he only slowly came to realize that Englishmen do not like to take their politics from their parsons but prefer to fight out their political battles themselves.

So he resolved that at Pudsey he would keep out of all party politics, and donning the clerical uniform which at Stratford he had been unwilling to wear, would devote himself wholly to the chapel and the congregation.

I decided to go too, and in the North, in new surroundings, would start again; this time I trusted I might find a way that would lead somewhere. So, expectant and full of new hope, I said good-bye to my colleagues at Epps' and left them.¹

It was a different matter bidding farewell at West Ham Lane. I could never hope to find better friends nor to be received anywhere with greater kindness, and it was with a heavy heart that I left the little group who came with me to the Romford Road, our usual parting place, and waved to them as they stood watching me turn homewards. I devoutly hoped I should see them all again, and I knew that if ever I came back their welcome would be just as kindly and sincere whatever good or ill fortune might have come my way.

And I did go back, many times, and spent many happy hours there; the little group remained among the most faithful friends of my life.

¹Some years later the house was pulled down and the site, including Capel Court, is now occupied by the Bank of New South Wales.

The Family Move Northwards *Pudsey. 1890*

WE arrived at Pudsey several days before our household possessions which father and I had packed and sent on by goods train. Our family was distributed amongst the congregation, and I stayed at William Noble's house which became my second home as long as I was in Pudsey. He was a remarkable man who in these days of opportunity would have gone a long way; well read, a good writer in the Pudsey dialect and a born leader. Mrs Noble was a kindly motherly woman who in her youth had had smallpox which had left her face badly pockmarked. This, however, in her early days, was no disadvantage to a girl but rather the reverse, as it was considered all to the good that she should have got over smallpox before her marriage. She kept a grocer's shop as well as running her house. At tea time her table was loaded with a great assortment of teacakes, scones, buns, cakes and the flat apple tart and cheese that appeared regularly at every well run Pudsey tea table. Sunday dinner was in the old Yorkshire style: a joint of beef was roasted on a spit before an open fire and kept turning so that all sides should be properly done; under it was a large Yorkshire pudding on which the juice from the meat dripped. The pudding was eaten first and each of us had a great slab, a custom going back to the days when meat was very dear and it was essential to take the edge off the men's appetites before they reached the meat stage.

Our house was square and stone built, the lower part divided into four equal sized rooms, upstairs was one big room open to the rafters, two small cubicles being boarded off.

The stone-floored rooms were cold and made habitable only by generous fires: the kitchen (in which we mostly lived) had a big grate and mother declared it would burn half a hundred-weight of coal daily. We bought coal at the pitmouth at five

shillings per ton, and cartage cost another one or two shillings. Mother complained bitterly when the pit price rose to 7s. 6d. per ton. I kept up my daily cold bath—which I fixed up in the outhouse—until it had to be filled overnight and the ice broken in the morning before I could get in. But I always had my early morning run.

I began immediately looking round for work. Pudsey itself offered nothing. It was a wool-weaving town, making flannel, blankets and other woollen commodities; the work was practically all done in mills, but the older people had been brought up as hand-loom weavers and indeed some of these still survived. Our house had been built for the purpose; the looms had been upstairs hence the absence of a ceiling. The weavers were mainly women and girls who worked in the mills until they were married and often afterwards; the men were chiefly supervisors, mechanics and such like. All our friends were quite clear that the mills offered me no prospects.

Leeds seemed more promising. I was rather attracted to engineering and thought I should like to be a draughtsman. I got an introduction to the firm of Kitson, then making locomotives in a big way, and I asked if I could be taken on in their drawing office. This request they turned down but offered to take me into their engineering shops. They said, however, I was too old for their liking and should have to start as if I were a boy of fourteen and serve a seven year apprenticeship after which I should become an engineer. The hours would be 6.30 a.m. to 6 p.m. and of course I should have to lodge near the works as it was impossible to get there in time from Pudsey. So that way seemed barred. Then I tried for a job as teacher at a private boarding school near Bradford. For this, however, I was too young. The Head Master was a rather likable person, and explained somewhat sententiously that 'this was a fault I was remedying every day' but meanwhile I was no use to him. Other interviews were equally fruitless; the expressions differed but the result was the same. When I surveyed the situation calmly, I had to admit that my qualifications were extremely slender: nothing beyond a few South Kensington certificates, which completely failed to impress any of the employers I approached.

I tried hard to get to college so that I could go on with my

scientific studies. The Yorkshire College, Leeds (not yet a University), was quite unable to do anything: there were no scholarships for which I was eligible; if I went as student the fees would be so much—but must be paid in advance. Oxford was equally unhelpful: I wrote to the Senior Tutors of various Colleges to ask about costs and possibilities of scholarships but received very discouraging replies. Meanwhile my Pudsey friends kept asking me: 'What are you going to do? A young man has no right to be idle!' Sometimes in the afternoon when I was rather depressed I would go in and see Mrs Noble, and she would give me tea and some of her nice cakes and talk in her bright smiling way about anything except the apparently hopeless quest for work. 'It will come all right,' she would say as I left. Neither mother nor father ever lost faith in me nor did they put any pressure on me to seek a blind-alley occupation. 'Do not be anxious,' they would say: 'Wait till you get work you feel you will really like doing.'

Meanwhile I was becoming more and more attracted to work at the chapel. Mr Noble was superintendent of the Sunday school and put me in charge of the oldest class of boys; they were aged from twelve to fifteen and were mostly engaged half or full time at the mill or in one of the Stanningley works. They were a sturdy vigorous lot and I liked them immensely. In the chapel I was making many friends. Gradually the idea shaped itself that I should like to become a minister and run a chapel like the one at Pudsey. I talked to father about it and we looked out particulars of the colleges. Manchester New College at Oxford would take me only if I had a degree. The Home Missionary College at Manchester did not seem quite suitable. The Presbyterian College at Carmarthen, however, seemed to be exactly what I wanted. The Reverend E. Ceredig Jones, the very benign minister at the Bradford church, had been a student there; we met him and discussed the matter; he was enthusiastic about my going and wrote to the Principal, Walter Evans. The reply was very sympathetic; the cost was small and was in any case covered by grants. There was therefore no financial difficulty. The Principal strongly urged, however, that I should take London matriculation before I entered and then in the interval get well on with the work for the Intermediate B.A. examination with a view to sitting for that at the end of my first year.

It was now August and I decided to sit for the matriculation examination in the following January, five months hence. I had only the old University Correspondence College Guide which I had bought for one penny in London, and it was impossible for us to raise the money to pay their fees, so that I could get no help from them. Nor could we spend much on books. Father had his old text books of 1870: some of these I might use but a few new ones were essential; these we bought. But I could get no tutorial help nor could father or anyone else available answer questions that puzzled me. There were only five months left, and my education hitherto had been desultory in the extreme.

However I was not to be put off. I worked out a programme that gave me some ten hours a day study and three hours walking which I thought would be a reasonable allowance for keeping me fit. On Saturday I would have a longer walk and Sunday was a complete rest.

The lecturer in Latin at the City of London College had thoughtfully provided us with multigraphed notes which proved invaluable as they completely anticipated the examiner's questions. Neither the French nor the Chemistry presented any difficulty; not that I knew enough of either, but they both fascinated me so that it was a pleasure to work at them. For the mathematics I had bought some new books: Pendlebury's Arithmetic and Stevens' Algebra, and each presented its subject attractively. English history gave me most difficulty as I had no memory for dates and I had only the very dull text books of 1870. But I kept grimly at it.

Finally January came, and I turned up at the Town Hall, Leeds, where the examination was being held, with little anxiety about anything except English history. The first two days passed well, then came the dreaded history paper. The night before I had looked up certain things at home, and, on arrival at Leeds, having time to spare, I was browsing in a second-hand book shop and lighted on a history book which I opened, and proceeded to read a page about some charter or declaration: it rather pleased me and I read it again. Then I went to the examination room, picked up the paper of questions with a quiver of anxiety. I could scarcely believe my eyes when I saw that two of the ques-

tions related to the very things I had looked up the preceding evening, and a third was on that very subject that I had been reading only half an hour beforehand in the second-hand book shop. I felt that the Fates were truly on my side; all my fears went and when at the close I triumphantly handed in my book of answers I felt no fear for the result.

Before long the news came that I had passed in the First Division.

The Bradford Technical College, where at an evening class I was studying Mechanics in the hopes of getting another South Kensington Certificate, announced the result in the Press, and my Pudsey friends were delighted. Some of them thought my whole course of studies was now completed and I could enter the Ministry forthwith. This success meant that I could enter Carmarthen in the following October and should be excused the entrance examination, excepting only Greek.

I took a few days holiday, spent mostly in long walks, and then started on my new course. Greek for the Carmarthen entrance was my first preoccupation; fortunately it was very elementary: Xenophon's *Anabasis*, and St Mark's Gospel; in addition I read Godwin's Grammar. Having no tutor I found it very difficult. At the same time I pushed on with the other subjects for the Intermediate Arts examination, wasting much time through the unsuitableness of some of my books, though a very kind Swiss lady helped me with my French.

It was an intense relief to feel that the long and anxious quest for a career was now ended, and that I should enter college in October.

While keeping hard at my studies I spent a great deal of time with my friends. Pudsey in 1890 was very isolated and very self-centred, though none of us young people realized it. It stands on top of the hill and its church tower is a landmark for miles round. It was not large, and nowhere was one far from the fields; Stanningley was our nearest neighbour but the road there was not yet fully built up. Another neighbour was Fulneck, then a tiny village with a settlement of Moravian brothers who were deeply respected in the neighbourhood for their honest, upright way of life. For another village, Tong, we had great contempt, though I never could discover why. There, as at Pud-

sey, the great event of the year was the autumn fair or 'Feast', but we were always very scathing about their effort and we never tired of hearing James Alfred (we mostly used two Christian names) relate how a Pudsey man had gone to Tong feast but had to take a candle to find it. They were not backward in expressing themselves in regard to us: Pudsey Far Town, they said, must surely be the last place that God had made. We (who all lived either in Church Town or in Low Town) had secretly to admit that Far Town wanted some explanation, but we naturally said nothing about that and retaliated that Tong must clearly have been the first place He made.

Our people, as I have already said, worked either in the mills or in the iron works as did most of the population. The mills were mainly owned by small men, who worked with the employees and were commonly addressed by their Christian names, even by the juniors: no special deference was shown them, and the employees retained full independence. But the mills were cold and cheerless; noisy, ill-lit, draughty in winter, and unpleasant in summer. Titus Salt had started a garden mill-town at Saltaire, but the idea was not much followed.

The workers and their children all wore clogs during the week, and the women wore shawls round their heads and shoulders, a very warm and comfortable arrangement. Some of the older men wore cotton smocks but the younger ones did not unless their work required it. But in the evenings, and on Saturday afternoons and Sundays, clogs, shawls and smocks were alike discarded and all got into boots and hats.

On the other hand the shopkeepers wore neither clogs nor shawls and in consequence felt themselves socially superior to the mill workers. There was, however, no cleavage, and all were equal in the chapel on Sundays.

But there was another element in the population of which I heard at times though I never made the acquaintance of any of them. These were 'the quality'; they differed from us in every way. We were dissenters, they were orthodox, although one of our late ministers had exposed the weakness of their position; we were Liberals or Radicals, they were Tories; in general where we were anti- they were pro-. Still more important, they did not, like us, have to obey the summons of the 6 a.m. 'buzzer'. We

accepted them, however, as part of the scheme of things and felt no envy or subservience to them.

We had three important holidays in the year. In the autumn there was Pudsey Feast, held in the Show Close; it lasted a week and the mills 'loosed', i.e. ceased work and the people 'laked'. Those with money went away to Scarborough or elsewhere, but most of us stayed at home. There were the usual swings, roundabouts and booths; on this occasion the proceedings were enlivened by two rival herbalists and bone setters dressed up as Red Indians purporting to dispense Red Indian herbs good for rheumatism, our commonest trouble. They were pretty good at massage and each had successes to his credit. 'Sequah' would make most scathing comments on 'Sequoi', who replied with spirit, and we would go from one to the other to compare notes. 'Sequah' however won by declaring that Pudsey pleased him enormously, and he intended marrying a Pudsey girl and settling down among us. 'Sequoi's' reply was offensive and he was promptly 'sodded'—clumps of turf were hurled at his head and he was rather damaged: he was lucky not to be well 'paused', i.e. kicked; but in the morning it was felt that 'they shouldn't ought to ha' sodded him'. 'Sequah' kept his word; he remained married, and opened a little shop.

At Christmas we had a big party at the chapel beginning with a 1s. tea and going on to a concert and games. At tea I sat with Norah and Esther, two of my special friends, and Norah was very lively till admonished by her father, who had paid for several daughters, and wanted to ensure full value for his money: 'Stop thy gab, lass, and get on wi' thy tea'. We danced the Sir Roger but not the modern dances.

On New Year's Eve the Mummers came round to our house: a group of young men with blackened faces who walked into the house, spoke not a word but 'mummed' all the time; they had a broom with which they swept the floor, sweeping the Old Year out and making way for the New.

Our next big event was Whitsuntide and this entailed more preparation than any of the others. For weeks beforehand we learned some new hymns; our organist, Arthur Pearson, was very successful in composing tunes with plenty of swing and melody. On Whit Monday morning each of the chapels and churches

organized a special choir procession round the town, and each procession would stand at agreed places and sing its hymns. There was nothing in the nature of a competition, but the townspeople listened to us all, and we felt very proud to hear the general comment: 't' Unitarians had sung well'.

In the afternoon each chapel adjourned to a separate field to play games: boys and girls generally played separately though a few hardened spirits played joint games usually involving kissing.

Our big day of course was Sunday. There was no mill and no buzzer; people could 'lig a-bed' as long as they liked. Morning service was not till eleven; after that the older men, often in tall hats and smocks, would walk round their gardens or allotments and admire or criticize each other's vegetables and pigs. Long afterwards I learned that the famous 'Yorkshire White' pigs had been evolved by Yorkshire weavers and miners in just this way. In the afternoon there was Sunday School; after that I was nearly always out to tea: an impressive meal, when the table was loaded with a variety of scones and cakes, each of which had to be sampled. Then followed evening service after which the married people went home, while a little group of the young men and myself would go for a walk. They were all millworkers or labourers, and one of the brightest was James Alfred, a labourer at the Stanningley foundry, who like many others had suffered badly from rickets in his childhood and was bow-legged. Our conversation ranged over wide fields: we would begin with the week's events in our homes and lives, and then talk of impending events, but would soon get on to something we had been reading. We rarely saw a daily or evening paper, and the local paper appeared only once a week. That of course gave all the more time for other reading, and our group were keen readers both of poetry and prose, especially James Alfred, who could quote long sections of Tom Hood and was adept at making Hoodian puns. Like the others he was greatly impressed by Longfellow, whose call to life and action stirred the young people of the 1880's and 1890's to intense vigour. Like the others, too, he had read Martineau and the American Liberal writers, especially Emerson, and we talked much of them. There was no Public Library, and none of us could afford to spend much on books. but

we made great use of a series of penny books each giving quotations from one author, which W. T. Stead had brought out. Occasionally we might get on to ghosts, a subject about which we were not too certain: there were tales of someone in Far Town 'coming back'. Looking back I cannot recall any sexual or racing talk and there was very little about sport. Cricket was popular, but not yet football, although some of our people went to football matches on Saturdays.

Although we talked little about girls it was fully expected that at the age of eighteen or thereabouts a young man would tell us he 'were capped wi' yon lass', and would then leave our bachelor group and go off 'walking out' with her. While in general view he would walk a few yards in front of her but when out of sight they would link up.

Marriage at twenty-one was regarded as right and proper; a girl might marry earlier but a man should not. There were always a certain number of forced marriages which, however, often ended better than might have been feared. Sometimes the girl would be a bit of a tartar and sometimes the man: the story went round about one who on the first morning of his wedded life turned his wife out of bed at 6 a.m. 'Nah then lass! get a-gate: thee must go to t' Mill: Ah'm liggin' here!' In general pre-nuptial intercourse was not heavily censured provided there was the intention of marrying if anything happened; it was usually the result of an overflowing vitality and the lack of any effective outlet such as organized games might have afforded. Some of the more attractive boys might get into more serious trouble, two or more girls being involved; if the young man did not wish to marry the simplest way of escape was to go to Canada or the United States, which in those days heartily welcomed the sturdy Yorkshire lads wanting to get on. The disappearance was quiet and often by night; we would hear in the morning that someone had gone, and before long there would be tales of some young woman, or it might be two, lodging applications for paternity orders, which, however, could never be executed. Sometimes the consequences were tragic: one girl whose father had always been very hard on her and who in desperation had said to him, 'I shall be my own mistress soon'—thinking the young man would marry her—was so stricken when she heard he had gone

that she broke down completely. Her father taunted her with 'How dost thee like being thy own mistress now?' But he soon had to regret it; within a week she was dead.

Another girl who had a bad name for 'daring' and inciting boys was running out of the mill when a failure of the lights put the whole place in pitch darkness. She fell over a bale of wool and was promptly seized by a group of boys; later word went grimly round, 'They gave that there what for'.

All these, however, were only incidents. There were of course bad lots both among men and women but they were strongly disapproved.

If it was wet on the Sunday evening we would, after chapel, drop into somebody's house, sit and talk for a bit and then sing hymns. If, as occasionally happened, there was a harmonium, I would play; about 9 o'clock we went home.

It would be wrong to think that we were particularly religious, and certainly there was nothing sanctimonious about us. But the chapel was the centre of our lives: it was our club, our community centre; for it we dropped our working clothes and donned our respectable dark suits, boots and 'billycock' hats. We were no longer 'hands' but living people, reminded each week of the moral and religious standards to which we were expected to conform.

We did a certain amount of calling in the evening during the week. Friday evening, however, was rigidly ruled out: it was 'fettling oop neet'—devoted to cleaning. Periodically one of our hostesses would give an evening party where we would play card and writing games, but we had no theatre, no 'pictures' and few concerts.

The public event of the year, and one that brought out all Pudsey, was the science lecture arranged by the Gilchrist Trust—then one of the most useful charities in the country. Sir Robert Ball came, and I listened with rapt attention; he was a wonderful lecturer.

On Saturday evenings there was a market on the Feast Ground. This was a great meeting place and some of our members had stalls to sell their knitted goods. The young men, myself included, used to slip round for half an hour to chat with some of the attractive young women at the stalls.

There were some comfortable houses but most of them were poor. They were stone-built, usually with stone floors downstairs. Many had only two rooms up and two down; there was often a bed in one of the downstairs rooms; the kitchen was 't'house' and the bedroom 't'chamber'. Some were built back to back; many had no 'privilege', i.e. yard of their own. Few had water in the house, it mostly had to be carried from outside. There were no baths and no indoor sanitation and the arrangements were rather primitive. The dietary was not usually good: tea and tea-cakes were the chief items, and many of the young people suffered from rickets and stomach troubles. The poor diet was the result partly of lack of money but more often lack of time and of nutrition-consciousness; it was not due to bad cooking.

A housewife was expected not only to be a good cook but scrupulously clean. The house and steps must be well scrubbed each week, even the pavement was not exempt. Some were 'house-proud' to an exaggerated degree and regarded the ho-band as a bit of an encumbrance.

Our people were very abstemious. The married men smoked pipes but the younger men smoked very little. Cigarettes were rare and cigars I never saw. Spirits were not usually drunk but beer was permitted to adults and some of the men were distinct connoisseurs: it was good to see John William smacking his lips after emptying his pint pot and declaring roundly that Tadcast^r Ale was 'well worth belly-~~soom~~'.

The old dialect still survived and was regularly spoken by the older people. The younger ones, however, had been to the Board School under teachers from other parts of England and so came to a more standardized diction. But woe betide anyone who gave himself (more commonly herself), airs on this matter. 'Dutchin' it' was heartily disliked. On the other hand, while my interest in the dialect and the vocabulary I started compiling were both approved, I was not encouraged to speak the dialect myself.

We were very happy at Pudsey. The congregation liked my father, and I often heard him compared kindly and to his advantage with some of his predecessors: One of these, evidently somewhat of an equalitarian, had always been called Fred, 'we

got a-gait a-calling him Fred and we went on'; he was, however, lacking in dignity and it was not thought quite the thing that on Saturday nights he should himself go in his shirt sleeves to fetch the jug of beer. Another was a good enough man but no preacher: 'never a nicer man out of the pulpit or a poorer one in it' was the comment.

The children also prospered. My sister Laura went to Channing House School, Highgate, through the generosity of Miss Sharpe who took her without fee. Arthur and our cousin George went to the school at Stanningley. They went by the little branch line that then formed Pudsey's only link with the outside world—there were as yet neither buses, trams nor through line. The journey was a very friendly affair. A school boy looking out of the window one day got his hat blown off and shouted out to the driver 'Tom, I've lost my hat'—and Tom pulled up the train so that the hat could be retrieved. On one memorable occasion my young brother was allowed to travel on the foot-plate and to think he was driving the train.

For me the time passed very happily. I was getting on nicely with my studies, I greatly liked the people both young and old, and they showed in unmistakable Yorkshire fashion that they liked me; I was utterly unconscious of any feeling of isolation. I felt that I could quite happily have passed my life there without bothering about Leeds or Bradford or London which now seemed infinitely remote.

But September came and I had to go to Carmarthen. For weeks mother was preparing my things and she bought a tin trunk in which to put them. She and father went down there to interview the Principal, Walter Evans, and to find me lodgings; they came back delighted. The last Sunday arrived; at the afternoon school William Noble spoke of their sorrow at my departure and invited me to speak. But I couldn't: I was both sad and shy. The next morning I went at 8 a.m.; father was in bed with a severe chill, mother was in tears, the children were excited. At Stanningley, where I had to change, James Alfred and Tom and Ernest had all taken half an hour's leave (with loss of pay) to see me off; they carried my new tin trunk and put it in the train. We said 'Good-bye till Christmas!' and I thought it would be only a short time before I should be back again.

But I never did go back to live there. Within a few weeks father was offered a larger church at Padiham, and as the children were growing up he felt he ought to take it. So at Christmas I went to the new home instead of the old one. It was nearly twenty-five years before I returned to Pudsey and then only for a few hours. I had fully expected to be forgotten, but I had not realized the permanence of Pudsey friendship. For most of my old friends life had been good and they had acquired better homes than those I had known; there had been much re-building and much quiet improvement in the town. Best of all, the old friendly spirit still remained, and I felt that life could have passed very happily, even if uneventfully, among the Pudsey Unitarians.

CHAPTER IV

I Start College Life *Presbyterian College, Carmarthen. 1891*

IN September 1891 I entered the Presbyterian College, Carmarthen. I well remember my first day there. I walked round the town arrayed in my 'billycock', the rather smart overcoat which had been given me, and a new brown suit which was soon to get out of shape through neglect and mud-stained through long walks. I wore also the high collar and big made-up tie then obligatory on all young men. I was elated with the new sense of freedom and the feeling that here at last I was completely master of my fate and responsible for my own life.

The Principal, Walter Evans, impressed me greatly; he was the first man I had met who could truly be called a scholar and a gentleman. At Jesus College, Oxford, he had read the classics and remained deeply interested in them; he told me he derived more help and, as he grew older, more consolation and satisfaction from the classics than from any other source. Like my father he had passed through an agnostic period, but now accepted the Unitarian presentation of Christianity.

He was very emphatic that I must sit for London Intermediate B.A. the following July. I said I would also like to take the B.Sc. degree. To this he saw no objection, but it would be practicable only on condition that I could win one of the open scholarships at Aberystwyth in September. I said I would try.

So I set to on the double programme. Professor Philemon Moore, widely read and benevolent, took great interest in me and lent me books on chemistry for the scholarship examination. The Principal helped me with Latin and Greek; we read Cicero, Horace's *Odes and Satires*, and Euripides' *Ion*, besides long extracts from Ovid, Livy and other writers. It was, however, not only the Latin and Greek, but his sage counsel and comment on

what we read and on what was going on in the intellectual world, that proved so helpful. My translations had to represent not the words but the thought behind the words, and they must be as clear, concise and convincing as I could make them. I felt that for the first time I was getting some education and perhaps some rudiments of culture; hitherto I had only been learning things, but he made me feel the great gulf between instruction and education. My contact with Walter Evans made me a firm believer in the value of a classical education.

The students were all Welsh except myself. Many of them came from small hill farms or from small Welsh towns, and a few from the industrial areas of South Wales. They were a clean-living good set of men, very keen to enter the Ministry; some rather chafed at the idea of spending two years at college. The disciples, they said, had been chosen among the poor and the ignorant, not among the scholars. If we know our Bibles what need have we for other learning? Others, however, took the view that a minister could not be too well equipped. The college authorities adopted a very wise compromise; the first year's course was a general education: Latin, Greek, Hebrew, mathematics and logic, and the second year was devoted to theological studies. Each Saturday morning one of the second year students had to preach a sermon, which was then criticized and discussed by the whole college, students and staff. On Sundays the second year students were allowed to take preaching engagements for which a nominal fee of about 2s. 6d. was paid, together with travelling expenses and hospitality. This gave the students the opportunity of sampling the various chapels in their denominations and of deciding on one to which they would like to aspire.

Some of the students were very shaky in their English. There was a story of a student's sermon on the Temptation which began: 'What the Devil was he doing? What the Devil was he wanting? What the Devil was he saying?' Matters were made more difficult by the students' reluctance to prepare either prayers or sermons beforehand: you should pray for inspiration when you enter the pulpit, they said, and then leave yourself in God's hands. When the service was in English those with an imperfect knowledge of the language were often in great diffi-

cuties—one of them confided to me very sadly that the Almighty had utterly forsaken him on the preceding Sunday. But the case was entirely different so long as the service was in Welsh: then they got through all right; it was imperative for a good preacher to get worked up into the kind of religious frenzy called the 'hwyl', and that they could do. Cooler and more critical members of the congregation would complain at times that their minister continually repeated himself and never gave them anything new, but the reply always was that there was nothing new to give: the Truth had already been given and our duty was to apprehend it.

Outside the college English was but little used and in most places was unknown. My landlady spoke and understood only a few words. The shopkeepers could use the language but preferred Welsh; outside the town English hardly went at all. One boy going up from a village school to the entrance examination at Jesus College, Oxford, had asked if he might write the essay in Latin as he would do it more easily than in English.

The college was non-residential but there were recognized houses at which the students boarded. I had two rooms for which I paid 6s. weekly to include fire and light (an oil lamp; we had no gas); my landlady bought my food and charged me with the individual items. Food was very cheap, especially when bought in the weekly market to which the farmers brought their produce. It was a picturesque sight; the women in their tall hats, bodices and full, heavy skirts; the men in gaiters; they drove in with their sturdy little ponies or cobs. Prices were very low: eggs ranged from 1s. to 6d. a dozen and butter from 9d. to 6d. per lb., but it was very variable in quality and sometimes very salt; meat (almost, always mutton) was about 8d. per lb., and milk 3d. or 3½d. per quart. There was, however, little variety; with all her good qualities Mrs Rees lacked my mother's skill in cookery, so that I would have a piece of mutton hot on Sunday then cold for as many days as it would last; nor could she manage pastry, so that the apple pies for which I yearned (and which still remain my favourite dish) now took on a very heavy and unattractive form. But she was scrupulously clean and honest, very kind and motherly, and she helped me greatly by having my room always so comfortable that I could make the best use of my time for study. She had been greatly distressed because her

son, a porter at the railway station, had recently married a girl who was at first useless as a housekeeper and could only 'sing the piano', but things turned out all right.

The routine at College was simple. Lectures were from nine to one with breaks in between when we would assemble in the common room and sing: of this the students were very fond and they made much use of tonic sol-fa, an exceedingly useful invention. Two English songs had got in: 'Tarara-boom-de-ay' and 'The Man that broke the Bank of Monte Carlo'. Sometimes, however, someone who had done something outstandingly wise or foolish would be 'chaired', but always with the greatest kindness.

For the afternoon and evenings we had no joint activities, there was no Union or Society of any kind. The students did not practise any form of athletics nor did they feel any wish to do so: a hint that the Governors would provide a boat if desired met with no response. They were associated with their respective chapels which gave them some social life.

My relaxation was, as always, walking, and I explored the surrounding country very thoroughly within a radius of about six miles: all my life I have always wanted to get to the top of any hill I saw in order to find out what lay beyond it. The roads were bad, and were mended by laying cart loads of broken stones and letting the local traffic settle them in, except for an occasional visit of a steam roller. But the faithful William Henry had made me some stout boots: in those days all our footwear was hand made. My clothes, however, suffered, and even the combined efforts of my landlady in term time and my mother during holidays could not keep them in proper form or instil in me a due sense of their proper care. I began to learn Welsh, and could manage a simple conversation, though I could never read the language or follow a sermon. The softly undulating green country pleased me immensely, in spite of the high rainfall.

There was no boating on the Towey except by fishermen who still used the light wickerwork coracles which on shore they carried on their backs. There was no bathing, and no bath in the house: the only bath I could discover was an ancient one at the barber's which I could use at a charge of 6d., but he did not encourage my going and it was clearly rather a nuisance for

him. The winter was cold and fuel less plentiful than in Pudsey; the coal was eked out by balls made of clay and slack which, however, were a poor substitute.

I found Sundays very dull. Park-y-Velvet Chapel was poorly attended: the four Unitarian students, one married couple, and a few girls from Mrs Marles-Thomas' boarding school with a keenly watchful mistress formed the greater part of the congregation. Service was on Sunday morning only. I really felt lost. Both at Pudsey and at Stratford the chapel had been the centre of my social life; here it could not be. I tried the Church of England; it was well attended, but nobody spoke to me and I got the impression of a very cold unsociable place. The Roman Catholic Church was no more attractive. At the Welsh chapels I liked the singing, but the language difficulty made me always a stranger. So I gave up the quest and stayed at home to get on with my work.

By far the best break from work was at Easter when I went for a ten-day walk round the coast: the account fills pages of my diary. I started on a snowy day in mid-April. The first stopping place was Amroth, and the last was Cardigan from where I walked across country to Carmarthen on the Monday, doing the 29 miles in $7\frac{1}{2}$ walking hours. Much of the journey was over country as yet unvisited by tourists and I had some delightful experiences. I stayed each night at cottages; the cost for tea or supper, bed and breakfast ranged from 1s. to 3s. 6d. Everywhere I was shown kindness and hospitality after the first shock of surprise at the idea of a young man walking round just to see the country. At almost any farm house I could have a drink of milk for nothing, and was not infrequently invited in for a rest and a chat, often with the polite request 'Will you please to have some bread and butter please?' and then when I felt I must move on: 'You're not going? It's joking you are.'

The whole session at Carmarthen was extremely strenuous for me and it involved a great amount of reading which I did according to a systematic time table of sixty-five to seventy hours per week. Besides Horace, Cicero and Euripides I had to read the 1760-1800 English writers, Johnson, Boswell, Wordsworth and Coleridge, including the Lyrical Ballads, for the Intermediate B.A. and later ones for my own pleasure; also a fair

amount of French: Dumas, Saintine's *Picciola*, Mme de Staël, de Musset and others. Nor was I exempt from preaching. There came a call from Swansea for emergency help and I must take my turn. So I prepared two sermons: one based very much on Carlyle's *Past and Present*, especially his doctrine of work; the other owing a great deal to one of Philemon Moore's discourses. Both were really essays. Philemon Moore very kindly spent a morning with me at Park-y-Velvet so that I could rehearse the whole service. I duly went to Swansea and got through all right; one lady indeed complimented me warmly but it was for the purely accidental and unpremeditated circumstance that my tie suited the gown so well.

At the end of the session I went to Aberystwyth to sit for the London Intermediate Arts Examination which I passed in the first division. I was now so fond of the classics that I hesitated whether to give up science altogether and continue in that line, but Walter Evans dissuaded me. Looking back I can see he was right; I lacked the special intellectual quality needed to make a first class classical scholar.

After the Arts examination I sat for the scholarship examination; in this too I was successful and was awarded the 'Visitor's' open scholarship. This, with a small grant from Carmarthen, would keep me at Aberystwyth for two years. The idea was that I should take the B.Sc. degree, then complete the B.A. degree, and then probably go to Manchester College, Oxford, but Principal Evans impressed on me that I must choose the work for which I seemed best fitted.

Examinations being now over I walked most of the way home to Padiham taking a fortnight over the journey. I went round the coast, struck inland to Snowdon and Beddgelert, then to Bangor. It was my first view of mountain and valley scenery and in my diary I tried vainly to record the vivid and lasting impression it made on me. But I was much less pleased with the people than with those in the south: they were far more sophisticated, completely used to tourists and visitors and expressed their relationships mainly in terms of shillings and sixpences. Also I met few interesting or likable people. Going up Snowdon I did, however, meet a cowboy from the Far West who had come over with plenty of dollars to see England; he asked me

if there were wolves or bears about, and he showed me the revolver he proposed to use against any he should find. Then too I had some financial anxieties as the cost was more than I had calculated: the 3s. daily that had been ample in the south was here only the minimum attained on two or three occasions: more usually I had to pay 4s. or 5s. for supper, bed and breakfast. At Bangor I effected some economy by cutting down food and sharing a bed with an elderly bearded Calvinist minister, but this was not a success as he scratched himself all night; however, on the savings I was able to explore Anglesey. But at the end when my account was paid only 5s. was left to get me home. I did not want to wire home for money as I knew my people were hard up. So I walked to Llandudno without food, secured for 2s. 6d. the return half of a first class excursion ticket from Liverpool and reached that port in great style at 8 p.m. with 2s. 6d. in my pocket and fifty-two miles to go. Near the landing stage I found a modest place where 'gentlemen' could have clean beds for 6d. or first class beds for 9d.; I chose the latter and had a cubicle to myself. Another 9d. went on supper and breakfast and I started off at 6.30 a.m. with 1s. in my pocket and only some general indications of the route given me by a friendly carter who occupied the next cubicle but was unfortunately not going my way. At midday I spent 6d. on food but by 6 p.m. was only as far as Horwich. Here I got better directions and was sent over the moor to Darwen. Unfortunately a mist came on and it began to rain: I was tired and desperately hungry and sat down wondering what to do. A carter passed and I asked him the way. He said it was useless to go on: the way went past the Scotchman's Stump where a Scotchman had been found dead from exposure; then past another place where in a mist a man had fallen and broken his neck; etc., etc. I said this was interesting but not helpful: how could I get on? 'You had far better come home and stay the night with me,' he said, 'then start off fresh in the morning and you will easily get to Padiham.' But, I explained, I had no money, only 6d. and that would not repay him. 'No matter,' he said, 'you need not worry.' So I went with him and stayed in his little cottage: a tiny place on the moor. His wife gave me a good supper and we sat round the fire talking. She told me her husband often brought in wayfarers for

a night; a few paid something: more did not; and some even disappeared during the night taking anything they could lay their hands on. But it did not matter: her husband was incurable. Later the game-keeper came in with his gun; he expected poachers that night and my host and I were to listen and give warning if we heard anything. He went, and we retired; I slept downstairs on the settle and heard nothing—nor should I have heard an army of poachers, so tired was I. In the morning my kind hosts gave me breakfast, full instructions for the route, and lent me 2s. for food on the way. So I got home, and wrote repaying my debt and thanking them for their hospitality. Two years after my father was preaching at Horwich and they came to meet him, but I never saw them again.

During that summer and succeeding vacations I saw something of the Padiham people though not as much as I should have liked. They were mostly concerned with cotton, either as spinners or weavers, and some of the older ones remembered the terrible days of the cotton famine caused by the American Civil War of 1860, when supplies were cut off and the mills ceased work. There was much hunger, many were nearly 'clemmed'—starved almost to death. Yet such was the pride of the people and their spirit of independence that they would suffer greatly rather than seek Poor Law relief, the only kind then available. In those days life had been almost as hard even when the mills worked, especially for the children; one of our congregation had begun work in the mill at seven years of age and had had to be carried there on his father's back. The conditions in the mills had been very bad and indeed were none too good even in 1892.

As at Pudsey, however, many of the weavers were well read: I have seen a woman at her loom with a volume of Lowell's essays beside her to read if there should be a temporary stoppage. Once a year we invited a distinguished minister to preach two sermons for which a respectable fee was paid; but our people were indignant when one of them, completely misjudging his audience, gave an elementary discourse, almost unprepared, which their own minister could have bettered.

During the week as at Pudsey the men's hands wore clogs and the women wore shawls but the clerical workers and the shop-

keepers wore shoes. This made a subtle social distinction. A family of competent and not unattractive girls was growing up unsought in marriage: they were 'gradely lasses' I was told, but 'shoes won't go, and clogs daren't'. On Sundays all dressed well and distinctions disappeared.

We were very self-centred and ideas of other places were vague. I was asked whether it was true that coal was scarce in London and had to be sold in paper bags.

The people, especially the women, worked extremely hard, and longed for rest, but they did not lose their sense of humour. Mother told me of one who declared that she would have inscribed on her tombstone:

'Don't weep for me now, don't weep for me never!
I'm going to do nothing, for ever and ever.'

The hard work and the ill-balanced diet caused some of the older women to be stunted and some to become very stout. This gave rise to a good deal of bantering; one of the local songs had the refrain:

'Shoo weighed, shoo weighed, shoo weighed two 'undred pound,

Oo may, oo may, oo may be rayer more.'

and there was the story of an epitaph which, however, I could never run down:

'Here lies Mary Alice Dobkin
She led a virtuous life and she weighed twenty stone.
"Open wide, ye Golden Gates!"'

Our leading school was of course the Burnley Grammar School from which a stream of able students was sent to the Owens College, Manchester, including J. H. Ashworth, the zoologist, who was for long Professor at Edinburgh, and George Bertwistle, who became Senior Wrangler and Principal Mathematical Lecturer at Pembroke College, Cambridge. Many of those who could not rise to the Grammar School, however, studied at the Mechanics Institute and had very useful careers; the struggle helped to bring out qualities of endurance and persistence that an easier life might have left undeveloped. They were kindly

hospitable people and their thrift was marvellous. 'Addlin' brass', i.e. gaining money, was a respected virtue. We learned without surprise that our charlady owned two or three houses and I remember an evening visit to two ladies who were knitting in a dim light with the gas turned very low: 'It saves gas,' they said, 'and we don't need more light for talking.'

In 1897 father was appointed to one of the Glasgow churches, and thenceforward I was but rarely at my parents' home.

CHAPTER V

At University College of Wales Aberystwyth, 1892-1894

I went to Aberystwyth a few days before lectures began so as to settle in and find my bearings. To say that I was happy would be a gross understatement: in those first weeks I was almost delirious. I would walk over Constitution Hill to Clarach, on to Wallog, and, if time permitted, to Borth, singing snatches of Welsh songs that Gwilym's mother or Mary had taught me at Tregaron.

Principal Roberts suggested that I should finish my London E.A. but I was desperately anxious to study science and he did not press the point. So I began with Chemistry, Botany, Zoology, Physics and Mathematics, those being the subjects then prescribed for the London Intermediate B.Sc. examination, and an excellent course they made. Chemistry was taught by Professor Snape, a very keen worker at the Wesleyan chapel as was his wife; his elementary lectures were enlivened by experiments put up by his assistant Ramsay, and out of sheer enjoyment I got permission to attend them. He did no research and was always nervous about any laboratory work because in his predecessor's time a fire had started in the laboratory and burned down much of the building. Professor Humpidge had never recovered from the shock and Professor Snape did not want a recurrence.

Zoology was taught by Professor Ainsworth Davies, a humorous lecturer who punctuated his discourses with jokes, which, however, some of the less respectful students declared had been given last year and would be repeated next year. He was doing a small research on the sense of direction in limpets though he never got far with it. The lecturer in mathematics, Mr Johnston, was highly nervous with a great tremor probably intensified by his habit of drinking much strong tea and smoking quantities of strong tobacco. He was very popular and any ragging was

kindly done. Women students would occasionally go out of their way to pass him on the 'Prom' in a wind when he would have to take off his hat to them, and probably drop his books, his stick and his pipe, and there would be a rush of gallant swains to help the young women who were helping 'Johnny' to pick up his scattered belongings.

There was much more mingling of the Arts and Sciences than in the larger colleges, and we all knew and admired our Arts Professors, especially the very kindly Professor Angus and C. A. Herford, Professor of English, who was beginning those studies that later brought him such distinction. The very versatile Professor Ethé, a man of monumental learning, was described in the syllabus as responsible for French, German, Italian, Persian, Arabic, Hindustani, with a footnote to the effect that he would be 'happy to read with students in other oriental languages'; of course he was always called the 'Professor of other oriental languages'. He was a short, fat little German, with an equally short, fat little wife; both were very hospitable and popular as they organized mixed picnics and did not too harshly chaperone. The 1914-1918 war was a great grief to them as it involved them in internment and separation from their friends.

Practically no research was done by either students or staff. It was held that a Professor's primary duty was to teach, and if he had further leisure, to serve the community in some way, chapel service being particularly meritorious. A change, however, was beginning. The new lecturer in Physics, G. H. Schott, arrived and started research work which ultimately got him into the Royal Society.

The students were almost an ideal body: young people of all classes, of widely different histories and tastes, brought together in beautiful surroundings under a kindly staff, but with insufficient money to attract professional parasites and not sufficiently numerous to segregate. We all mixed freely whether our studies were arts, sciences, the new 'Normal Course' for teachers, or the new experimental 'General Culture' course. A fair proportion were English, especially among the women, but the large majority were Welsh and the college was a distinctly Welsh institution; the atmosphere, however, was in the best sense cosmopolitan.

Many of the Welsh students came from small farms or mining villages. Welsh surnames are neither numerous nor distinctive; and men were often called by their Christian names and the name of their home, e.g. Toom Tynant (Tom Evans of Tynant). Some of them had to borrow money to come, usually on the security of a Life Insurance policy with the backing of the local doctor. The men lived extremely frugally. There was no hostel for them, but rooms with fire and light could be had for 6s. per week upwards (I paid 7s. for two rooms). Parents or friends who came to the weekly market would bring some food and the rest cost little; there was little smoking, less drinking, and few other temptations to spend money; the theatre functioned only occasionally when some very poor company arrived¹ and of course there was no cinema. The college fees were low. A man could get through on £35 per annum to cover all expenses: living, college fees, books, etc. My total expenditure was about £40 per annum but I lived better than some. At the other end of the scale, however, were men who lived on the 'Pæom' in big rooms for which they might pay 20s. or 25s. per week; during holidays they had to clear out or pay much more.

Some of the village schoolmasters took great trouble to send their pupils to college. From the little village of Llanarth there came a remarkable group of students well prepared by a most excellent schoolmaster, John Edward Rees.² At least two who came in my time achieved distinction: T. J. Evans became the honoured Dean of Guy's Hospital; Jenkin James became Secretary of the University Council; while a third, Dai Rees, became an eloquent speaker both on the political platform and in the pulpit. It would be difficult to overpraise some of those old schoolmasters and mistresses (Mr Kemp of Machynlleth was among them); they devoted their lives to their villages and their pupils, helping the clever ones to get to college, but not neglecting those who were less gifted. Happily one still finds many such men and women in the profession. Some of the women students (officially called 'lady students'), especially the English, were older than the rest and came from families where the sons were

¹ Their arrival was announced by the Town Crier, who at selected places rang his bell and told us of coming events.

² Afterwards Head Master of a school in Barry.

sent to Oxford or Cambridge but less money was available for the daughters. They gave a stability and an air of seriousness to the women's side that had a very wholesome effect. All were housed in the Queen's Hotel under the guardianship of Miss Carpenter. She was a strict but kindly disciplinarian and insisted on tidiness: she carried always a packet of hairpins and of ordinary pins to repair any incipient lapses from her high standards. Men and women students were permitted to mix only in the College Hall during the five minutes interval between lectures, at occasional 'At Homes' organized at the Queen's Hotel or at the college, and at rare picnics organized by a Professor. At one college party two or three couples sheltered in a bay in the library, which having as yet no electric light was very inadequately illuminated. Miss Carpenter walked in with a couple of lighted candles which she placed on the table, and, beaming, said: 'I thought you would like some light, my dears.'

The dresses of the women students would now seem very unattractive. They wore flat straw hats, close fitting bodices with sleeves shaped like legs of mutton, full on the shoulders and tapering to the wrists, and long skirts that swept the ground. The costume certainly was very hard on a plain awkward girl. But an attractive graceful girl managed to carry it very well; she would of course modify it the better to suit her: she could slightly but skilfully raise her skirt out of the dirt on the pavement or in going up the steps to the college entrance, and with a graceful flick manage to reveal a shapely ankle. Naturally it was not possible for the women to play games in these clothes but in any case they did not play much. One day, however, a notice went up that on Wednesday afternoons the lady students would be playing hockey on the athletics field, and would all gentlemen please keep away. As the women students were allowed to watch us play football in shorts we were curious to know why we could not watch them, and Glanville, who was *persona grata* with Miss Carpenter, tactfully asked the reason. She paused a moment as if feeling the question embarrassing, and then jerked out: 'Well, you see, Mr Glanville, when—a lady—is playing hockey—her back hair—may come down—and no gentleman—should ever see a lady—with her back hair down.' To that of course there was no answer, but somehow the problem later found a solution.

There were periodical dances that I should love to have attended, but I could not dance, and I had no time to learn, for my examination in July had to be passed well, and the pleasures that others took were not for me. For the same reason I never attended the men's smoking concerts, or the meetings of the Debating Society.

Many of the women wanted to become teachers in the new secondary schools that were then springing up throughout the country, and they were entering the profession with considerable enthusiasm. Some were inspired with a high missionary spirit; they had directly or indirectly come under the influence of those pioneers of women's education, Miss Beale and Miss Buss, who had broken away from the injunction 'Be good, sweet maid, and let who will be clever,' and maintained that a girl should be prepared for some profession so that if she should not marry she could still lead a full and independent life.

As a result of the great diversity of students, and the intermingling favoured by our isolation, our interests were pretty wide. We had little in the way of newspapers; my contact with the outer world was maintained by the *Spectator*, which a friend sent me weekly when he had done with it, and which I read from beginning to end, freely using the big Webster that had been one of my first purchases. We maintained, however, a certain interest in politics. Gladstone's Home Rule Bill was the lively topic of those days; many of the English students were against it and many of the Welsh for it, not out of any knowledge of or interest in Ireland, but because they thought Home Rule might be good for Wales. We had of course our politicians, chief of whom was one who intended to devote his life to politics and to enter Parliament. He spent his time preparing and delivering political orations and became a very fluent speaker. He rather neglected his studies and was pulled up by the Principal who, quoting Plato, impressed on him the need that the rulers of a community should have the best and highest education possible. But Edward knew better; with a smile he pointed out that Plato was considerably out of date; that a modern electorate wanted a man who could canvass smilingly, and speak loudly and entertainingly, and he was learning to do that. Events proved that he was right: he sat for a number of years in the House as quite a

useful member; indeed he gained the gratitude of his party by winning a recalcitrant constituency—because of his smile, as he modestly confided in me.

We were too remote to be much affected by the aesthetic movement then flourishing at Oxford and in London though some of the women had leanings that way. Most of the men were sincerely religious but there was practically no trace of the hysteria that broke out later in the South Wales Revivals. Occasionally someone who had been reading Todd's *Student's Guide* would lecture a fellow student at length, but these efforts were discouraged.

But a blatant atheist, who greatly annoyed us by his superior airs, was dealt with faithfully. Letters were written in his name to each of the ministers in the town, saying that he had been an atheist, that he was now perturbed in his soul and anxious for spiritual guidance: would Mr X kindly come round to his rooms and help him? A date and hour was suggested. There was no need to reply, etc., etc. No minister could allow such an appeal to pass unheeded and at the appointed time each came. So a potentially peaceful evening was completely spent in a succession of interviews skilfully arranged one after the other to ensure that the more fiery ministers should come in just at the right times.

I took to boating and became a 'captain' of the boats, sometimes with more enthusiasm than discretion, but I never could achieve any style in rowing.

Football was the favourite sport for the men but I could develop no interest in it. My chief relaxation was walking and I very thoroughly explored the country round about Aberystwyth either alone or with T. J. Evans, T. J. Thomas, W. E. G. Glanville or Alec Gibson. I was greatly interested in the life of the people. My landlady helped me here: she was well known to many of the farmers' wives and they dropped in to see her on market days. So I got to know them, and in turn would drop in on them during my walks. The way up to the little farmhouse from the road would sometimes be almost incredibly muddy but there was always a warm welcome when one got there. Much of the old life still survived in some of the remoter places, and still more of it was remembered by the older people. Fires were commonly of peat or wood on the hearth and kept going

continuously, being banked up at night. The cooking was done in a pot suspended by a hook. I have known one and the same pot to supply first of all meat and vegetables drawn out as a stew, and then a suet roly-poly pudding tied up in a cloth. Bread was baked about once in ten or fourteen days; in places there was no yeast but some of the dough was kept over to start the new lot rising; a special oven was used, previously heated by wood. The loaves were flat, not the two-storeyed cottage loaf or the 'tin' loaf of the town; if they got too stale to be pleasant they could be freshened by heating for a short time in the pot over the fire. The flour was from home-grown wheat locally ground; it was a soft wheat and could never give the nicely shaped well piled loaf popular in the towns. Barley bread was not uncommon; when quite fresh or reheated it was not unpleasant, but as it became stale it was much like sawdust. The butter was home made, and sometimes very soft; jam and cakes were rare; and there was nothing to correspond with a Yorkshire tea. Home-cured bacon and ham were common but very variable in quality; eggs were usually abundant.

It could not be said that the women were good cooks, but they were clean and extremely industrious, busily knitting whenever they had free moments. There were still rush lights made from rushes peeled so as to leave only a thin strip of green to hold the pith together, then steeped in molten fat. The rush was held by an iron holder and gave a quiet little light, more like a taper than a candle.

The Chapel had a very strong hold on the people, and to an even greater extent than at Pudsey or Stratford was the centre of their lives. Sunday was most strictly kept; when travelling I could never move on that day but always had to stay where I was and attend service. This was of course in Welsh but not infrequently the preacher, apprised of my presence, would for my benefit insert a few sentences in English, sometimes rather broken. Services on special occasions were sometimes long and numerous: I once saw an announcement of seven sermons on one day. The walk to and from the chapel was all that was permitted and it must not be unduly prolonged. In the evening after service we would gather round the fire and sing hymns—and gossip.

As in Carmarthen many of the country people, especially the

farmers, had little or no English, but a remarkable knowledge of the Welsh Bible and this gave them not only a great fluency in good Welsh but a breadth of culture not otherwise easily attainable. The young people, especially those who aspired to be students, practised widely the 'Darlith', the giving of lectures in their schools and chapels, thus fostering habits of self-expression. There was a keen desire among many of the young people to compete at the local Eisteddfod and the result was a widespread practice of the art of singing, especially unaccompanied singing, for few of the village chapels had any instrument, nor indeed did they all approve of instruments; and none of the houses had pianos. Many of the young people wrote poetry in some of the very complex Welsh metres, and T. J. Thomas, 'Sarn Nicol', the most cultured of our group, achieved the very high honour of being crowned 'Bardd' at the National Eisteddfod.

All this development of the power of self expression was greatly aided by the complete lack of any external means of entertainment; people were thrown on their own resources.

In the villages there was a certain amount of illegitimacy and more pre-nuptial intercourse, which was favoured by the bedroom courtship to which some of the young people were driven by lack of other facilities for meeting. Occasionally when I was late in the evening in the country I would see a youth hurriedly descending by a ladder from a bedroom window.

The older people, and some of the younger ones, had considerable belief in the supernatural, and many a story did I hear on my journeys. Not infrequently in the night a peculiar bird call was heard, or a light, the 'canwyll gorff' or corpse candle, was seen; either betokened an early death of some close relative or friend. One man assured me he had met in a narrow lane near his home a funeral procession; he stood aside to allow it to pass, and was petrified when he realized that there was no sound, nor could he recognize any of the people, nor had any death occurred in the neighbourhood. Almost anywhere there might be a 'bwbach' or ghost, and it was rather blood-curdling to travel at nightfall on the Aberayron road with Josh Lewis, the carrier, and get him to talk: for he knew every haunt of every bwbach on the road. It was worth the fare, even though the men had to walk up all the hills to lighten the load for the horse.

That first year at Aberystwyth had been one of the most fruitful of my life. For the first time I had had some direction in my scientific studies, and when in July I sat for the London Intermediate B.Sc. examination, I not only got a First but came out top in Chemistry and was awarded the scholarship of £40 per annum for two years, with the condition that I should sit for the Final B.Sc. examination at the end of that time.

I decided to spend another year at Aberystwyth and then transfer to Owens College, Manchester, where Roscoe had built up the best school of chemistry in the country. He had recently retired, but his successors, H. B. Dixon and W. H. Perkin junr., were developing it still further.

I started well at Aberystwyth but did not keep it up. Influenza broke out, and though I escaped it, the strain and overwork of many months past threw me out of my stride and the staff were very disappointed with me. I became very friendly with two arts students, W. E. G. Glanville, a well read man of considerable culture who greatly widened my intellectual interests; and a vivacious and very pretty newcomer, with the dimples before which I always collapse, who announced her intention of devoting her life to the cause of Woman's Rights; and who later told me that she was already engaged, and I retired hurt, feeling that the light had gone out of my life.

For a few weeks in the summer vacation I was in London reading during the day time in the libraries of the Pharmaceutical Society and of the People's Palace, but it was unsystematic and of little direct profit. The evenings and weekends were spent happily with my friends at Stratford; so happily in fact that I decided I would seek out a similar group when I got to Manchester.

CHAPTER VI

At the Owens College, Manchester *1894-1900*

THE courses at Owens College were arranged for the Victoria University, but I had to take the London examination. I entered in September 1894. My total wealth was £50 which had to pay for everything in the next twelve months; to this I later added £5, a cash prize for a chemical essay. I could afford only three days a week in the chemical laboratory and one course of lectures. I had to do without help in mathematics or physics, except what I could get from my Aberystwyth lecture notes and some rather unsuitable text books.

I chose W. H. Perkin's lectures in Advanced Organic Chemistry. They were a pure joy and a revelation. It was my first experience of a systematic course by a master; I took them down in shorthand, transcribed them and filled in details by reading. I came out first in the examination, gaining 99 marks out of 100, which won me some respect among the students. In the laboratory G. H. Bailey, Arthur Harden and Bevan Lean all helped me, but I was always clumsy and lacked training in technique, so that my analytical results and my organic preparations, though passable, were never remarkable. The students came mainly from the new secondary schools on scholarships given by local authorities (for none of which I was eligible). All were anxious to get Firsts so as to secure good posts, and usually had little interest in general reading, politics, or anything outside their work. There was a widespread sense of stability and security and we felt that things would always go on much as they were; there was no need for us to bother about them.

Life was very austere for me. During term time I had only 18s. a week; my rent was 8s. leaving 10s. for food and other expenses—except laundry, which mother did for me. This hardly sufficed and there was usually one hungry day a week; my diet

consisted in brown bread and butter and cocoa for breakfast and tea, an apple a day while they were to be had, no supper, the cheapest lunch the college provided (10d. or 1s.), and on the hungry day whatever lunch I could get for 3d. or 4d.; at this level Manchester did not offer much choice. The absence of a financial margin, however, saved me from the attentions of the 'bookies' and the female purveyors of pleasure at half a crown a time who haunted the district by night. Fortunately I neither smoked nor drank.

An old Carmarthen student, the Rev. Sydney H. Street, was in charge of the Renshaw Street Mission, Hulme, and invited me to help. I went round at 6 p.m. on the following Thursday to what was called the Junior Recreation Class, an hour's play for children under ten arranged by Mrs Street. The children greatly attracted me, and at the end one very friendly little mite of five kissed me goodnight and said, 'You must come on Sunday morning because I come on Sunday mornings'. So I did, and saw the little group again; the friendly Mabel duly took me in hand and showed me round. There were some particularly pleasing workers at the Mission and I decided to go regularly for the hour on Thursdays and Sunday mornings.

This excited no comment among my fellow students; it was then generally assumed that a man would be associated with either a church or a chapel. Some also took part in a 'Mutual Improvement Society' at which the members read papers they personally had prepared. For a stranger without much money but seeking friends the only alternatives were a chapel or a public house, and many of the chapels had young men posted near to them on Sundays, asking passers-by if they had anywhere to go, and, if not, inviting them to attend the service, seeing also that they were introduced to other young people.

Hulme had within living memory been a good residential district, but it had greatly deteriorated, though there were still some good working people who remained from better times. Some were in more or less regular employment in a warehouse, others kept small shops, among them one where herb beers of various kinds were made and sold; the favourites being Dandelion and Burdock, Sarsaparilla, and Camomile tea. Others were small craftsmen working at home under very trying conditions:

e.g. in the cellar. Two or three earned a precarious livelihood by playing the piano daily at public houses from mid-day till 11 p.m. and finding singers (often young girls) for the Saturday evening concerts, in those days the most accessible form of entertainment for working people. Some of these men had a certain amount of talent and but for an unfortunate taste for drink would have earned a better, though more strenuous, living by giving lessons, for which there was a considerable demand as every family with any claim to position had to own a piano and every daughter had to be able to play. But it was a bad career for the girls, and the possession of a good voice was by no means an unmixed blessing. Some succeeded in getting very minor engagements at the pantomime which occupied them from November to April, but at times even this was at the price of compliance with some man's desires; others dropped straight into prostitution; only very exceptionally did any good come of it. In general the songs were not bad: some were coarse, but it was the coarseness of a healthy carter; in the main they were sentimental, even to sloppiness, or melodramatic:

'. . . . I was so young,
I had no mother and I loved him so.'

Some of the men were commission agents', i.e. bookmakers. The less reputable arranged bets at street corners with men, women and even children: bringing many of them into trouble. The better ones acted as touts for professional 'bookies' at race meetings and would at times come home flush with cash, having also supped and drunk well; sometimes, however, they returned empty-handed and might have had to slip away unobserved because their principal had found it expedient to disappear. When off duty, sitting at home in shirt sleeves and stockinged feet, smoking a pipe and quaffing a glass of beer, these men could relate entertaining stories of their adventures.

A number of our members were widows with families of little children: they had been left without resources, sometimes even in debt through the illness of the husband before he died. I collected some of their weekly budgets; they were pitifully inadequate. I still preserve them in my notebooks of those days. It was quite usual to find families of four or five (two adults and

two or three children) living on 9s. or 10s. per week after the rent was paid.¹ Some had to manage on less: a woman left with seven children, the eldest being thirteen, had a total income of 15s. per week out of which she paid 6s. rent, 1s. for fuel, 1s. for shoes club, leaving 7s. weekly for food. For this, she bought 24 lb. bread-(2s.), 30 lb. potatoes (1s.), meat and bones (1s. 2d. —meat cost 4d. to 8d. per lb.²), 2 lb. dripping (6d.), 1 quart milk (3½d.), tea (4d.), sugar (3½d.), and clothes (3d.). The number of calories supplied would be about 60 to 65 thousand; they should have had some 100 thousand at least. A simple dinner was made of bacon bones (about 1½ lb., costing 1d.) stewed with lentils (1d.), potherbs (½d.), potatoes (5 lb., costing 2d.); or bacon (½ lb., costing 1d.), liver (½ lb., costing 1d.), stewed with onions, flour, potatoes, pepper and salt. The mother was an exceptionally good manager, and her children were healthier and better clad than many, but she had no margin for emergencies. That of course was where we at the Mission could help. When things went short the general rule was that the baby, the husband as breadwinner and the boys came first, the girls next, and the mother last. Many of the women suffered much from rheumatism.

There was plenty of work for women: domestic, office cleaning, and a whole host of trades, from cigarette making to underclothing and mackintosh making, but these involved absence from home all day, which was impossible for women with small children as there were no crèches. Some of the factories put out work which could be done at home but the pay was, pitifully poor: 6d. per dozen for making shirts (no wonder the buttons soon fell off!), 2½d. per gross for hemming handkerchiefs (three sides) and the women had to find their own cotton.

The evil effects of the undernutrition of the children were intensified by the lack of warm clothing and absence of baths; tuberculosis and stomach and intestinal troubles vaguely called 'inflammation' took terrible toll of the children, and hardly a month passed without our losing one of our group. Many of the mothers were unable to take their children for hospital treat-

¹ Money was then worth three or four times its value in 1955.

² 4d. was the usual price on Saturday night as the local butchers had no refrigerators and consequently had to clear their stocks.

ment, which was quite good but commonly occupied a whole morning in transit and waiting; if they could afford it they patronized the 'sixpenny doctor', usually a down-at-heels practitioner who would take an empty shop in a poor district, obscure the window panes, call it a 'surgery', and charge 6d. fee and 2d. or 3d. for medicine, the patient to supply the bottle. The regular doctors were very down on these people, but they usually succeeded in keeping out of trouble, and their power to sign death certificates shielded them against the consequences of any mistakes.

The minister was always called in when a child was seriously ill, and an unbaptized baby would be speedily christened, for there was a real fear that otherwise it might be a lost soul. Repeatedly I was told that the child had died singing a hymn.

It was necessary to have as elaborate a funeral as possible, and the burial club payments were among the last to suffer in bad times. Not uncommonly £8 to £10 would be spent on a funeral even when the family had lived in considerable poverty. On the other hand practically no provision was made for old age: it was the children's duty to look after their parents, taking them into their small and often crowded houses and not infrequently suffering much discomfort or worse in consequence.

In spite of the poverty there was a very high level of cheerfulness and far more *abandon* and joy in life than among my suburban friends. With some exceptions responsibility did not weigh heavily on parents; there was a great deal of clubby backchat in the little streets where people could live on their doorsteps, and if, to quote O. W. Holmes, there was often 'a steady stream of mutual undervaluation' it was frequently enlivened with sparkles of humour and a good deal of laughter. Then there were the holidays: Christmas, Easter, and Whitsun, the great events of the year, and various days in the summer; for these the thrifty saved beforehand in Penny Banks and the unthrifty pawned afterwards, except for Christmas when the unthrifty and some of the others patronized the Goose or Slate Clubs run by beer shops.

Pawnbrokers would advance money on deposit of goods, sheets and shirts being preferred as most likely to be redeemed quickly: they charged ½d. per month for each 2s. on sums under

£2 and for each 2s. 6d. on larger amounts. Moneylenders charged much more: often 1d. per shilling per month for small amounts or 1s. to 2s. per £ per month for larger sums. Bad debts, however, were not uncommon; recovery was difficult and unpopular.

Whitweek was the great event of the year. On the Sunday afternoon we paraded to the Free Trade Hall, each child in new clothes if only a reconstructed pinafore: there the Unitarian schools had a joint service, lustily singing new hymns that had been rehearsed for weeks beforehand. On the Wednesday afternoon we took the children on slow horse-drawn lorries to Sale, where a kindly hostess gave us the use of a field for games and provided tea and buns; we sang songs and hymns going and returning. On the Thursday we went by train into Derbyshire, centring ourselves at a farm at Chinley or Hayfield, had walks and provided tea—a long but thoroughly happy day. A charge had to be made for this, but we usually contrived to leave no one of consequence behind. On Friday the seniors had a day's outing, usually going a little farther afield. In the summer, we took a number of the children into Derbyshire for a week, staying at first in a roomy cottage or farm house and later in the Children's Holiday Home at Great Hucklow.

In order to keep the boys out of blind alley employment I helped them to become apprentices to some good trade or to attend training classes, while for the girls I ran a choir, hoping to develop a taste for good music. We were all very happy together and remained so: even today, nearly sixty years afterwards, some of the 'children'—now grandparents—still write to me, but not from Hulme, for they are now in better surroundings; some have their own cars and all look back with pleasure on the old times. Much good human material was wasted in those days.

At the college Perkin was busy investigating the constitution of camphoronic acid, a monotonous task, carried through only by his enthusiasm and perfect technique. Periodically he would leave his bench at the end of our laboratory (the Roscoe, for the Schorlemmer, was not yet built) and wander round to see how we were getting on: with a broad beaming smile and one hand stuck in his trouser pocket he would ask, 'Well, are you happy?'

and would either pass on or deal with the trouble. He was a keen musician, was becoming an enthusiastic gardener, and he had a great love of cricket. If in the course of a big match at Old Trafford one of the giants looked like making a stand, there would come a cryptic message to the laboratory and he would disappear. But we knew where he went, and often followed him at a respectful interval.

The months slipped by happily enough till October when I went to London for the final B.Sc. examination. This time I had no luck with the questions and one of the mathematics papers defeated me entirely. I was back in Manchester working in the laboratory when the list came out: Jones and Lees came with long faces to tell me my name was not there. They were good friends and deeply sympathized with me, for they knew my fears that this was my last chance. I went to tell Professor Dixon and to say goodbye; my funds were exhausted, my dream of becoming a chemist was rudely shattered. He asked me what I should do, I said I should go to one of the theological colleges, a course that was still open to me, and thereafter enter the ministry or follow one of the ancillary callings. He asked me if that was what I really preferred? It was one of those critical moments in life when nothing but absolute truthfulness would meet the case. I replied that I was interested in the work at the Mission and thought that I might do something useful in that direction, but I felt that I lacked the spiritual qualities needed for making a really good preacher; on the other hand I was deeply interested in science and would more than anything else have liked the chance of going on with it. He then questioned me about the examination and the cause of my failure, and before long had got the whole story out of me: the lost months at Aberystwyth, the lonely struggle with physics and mathematics at Manchester, the lack of guidance in my reading. 'But why didn't you tell me?' he said, 'Dr Lees would have found someone to help you with physics, and Professor Lamb would have done something about mathematics.' 'But I had no money,' I explained again.

• He thought a moment and then said, 'You are too good a man to lose. If you like to continue at science do so. I want a Research Assistant. If you would like the post you can have it.' I could

hardly believe my ~~case~~. The pay was very slender, £26 per annum: 10s. a week. There would of course be no fees. I did some rapid mental arithmetic. If I could get another 7s. a week I could manage by having two hungry days. I knew that the post of organist at Renshaw Street was coming vacant: if I could get that it would bring in nearly 4s. per week, I might hope to get coaching or other work to bring in the balance. So I thankfully accepted the offer at once. I duly got the organist post—not, as the leading treble with Manchester candour explained to me, because of any particular competence, but because they liked me.

In the meantime I could not afford another failure in the B.Sc. examination and must get proper help with mathematics and physics. I took the mathematics course with the University Correspondence College and C. H. Lees very kindly helped me with physics.

Part of my duty was to correct the notebooks of the students attending Dixon's lectures, which were by far the best I had ever read. He treated the subject historically, giving full accounts of the classical investigations but not worrying about the details that could be looked up in any standard textbook; his idea was that the students should know how the great scientists had proceeded, but he did not expect them to remember the minor discoveries of the lesser lights. I always regretted that he never published his lectures.

Meanwhile I had to meet not only my 3s. weekly deficit, but to pay the Correspondence College fees, and to save up for the examination in October. But I solved the problem. I got some lecture engagements at 25s. each, did some reporting at 21s. a time, coached some dull people through examinations that they never ought to have passed, and did various other odd jobs. After a while I was able to abolish the two hungry days, and finally in May I stepped into absolute wealth: a student of undoubted ability and merit, the son of a rich father, who had rather neglected his chemistry in his otherwise active life, wanted two hours' coaching daily for ten weeks. Dixon fixed the charge at 7s. 6d. an hour; when I got the final cheque for £45, paid promptly on the last day, the amount seemed incredibly great. I looked up the atlas for a secluded place where I could spend August and September in quiet reading for the examination,

fully determined that this time there should be no slip. I fixed on Lerwick in Shetland and went by steamer from Liverpool. There I did a lot of very useful reading, had a delightful holiday and was well looked after by my kind hostess and her daughter. It is a wind-swept, almost treeless and sunless region. I tried to describe a tree to some children but was hardly believed. Fishing claimed the men, and their usual greeting was 'What news of the herring?' Meanwhile the women tended the crofts and did their fine knitting. The return journey in October was rough, the boat was small and had no bath, but I was hosed with the decks at 6.30 a.m. A stormy eight hours in rounding Cape Wrath showed me that I had the great gift of being a good sailor.

Thanks to the systematic preparation I passed easily in the first division both the B.Sc. and the Honours Chemistry examinations, which then were distinct. I was not top in Chemistry, being beaten by G. T. Morgan, and rightly so, as he was a better chemist than I. But I went back proudly to Manchester and found that my salary as Research Assistant had been raised to £1 weekly, that I had been awarded the Dalton Scholarship of £50 a year, and was to give a course of lectures to evening students for which I should get £30; there was also the certainty of some coaching. I felt I was in absolute luxury, and adopted a better standard of living than ever before, having bacon every day for breakfast for the first time in my life.

I saw a good deal of Dixon and greatly admired him. He was a clear and penetrating thinker with great power of lucid expression derived partly from his mother who, as Miss Hepworth, had been a well-known writer. But he owed even more to his classical training; he was an ardent reader of Horace, and I rose in his estimation when I not only understood but was able to complete a line he was quoting. He introduced the Oxford practice of essay-writing, but made it optional; I seized the opportunity and benefited considerably by his incisive criticism and his insistence on the need for clarity and simplicity in thought and in style. He was, too, a good mountaineer and played cricket in attractive style.

The research problems to which he put me, however, were not very fruitful. They were two: rates of explosions in gases,

and the chemical inertness brought about by drying certain otherwise combustible gaseous mixtures. The technique required was very elementary, and chemical theory was not far enough advanced to permit of detailed discussions of the results. I felt this weakness and tried to get to Germany to take up organic chemistry. Germany then led the world in science, especially chemistry, and it was the ambition of everyone to study there. An 1851 scholarship came vacant and I put in for it, but Dixon explained to me that by a gentlemen's agreement it was due to go to the Engineering Department if they could put up a suitable candidate—which they did, so I missed it.

The following summer—1897—I spent in Switzerland, doing on foot the round, then fairly common, Geneva, Chamounix, Aosta, Zermatt, Oberland, Interlaken, Berne, Lucerne. Foreign travel was a simple business in those days. No passport or visa was needed for any Western or Central European country, and there were no currency restrictions; an average of 50s. a week was ample for all living expenses in the hotels marked with one or two stars in Baedeker. I took out my railway tickets in London, a process precisely as simple as booking to Manchester, had my 'Rucksack' on my back and took a bag with spare clothes which could be posted from place to place so that I could tap it each ten days.

I was a few days late at Manchester and found Professor Dixon a little perturbed. Without any warning he had appointed me Demonstrator for three years at £100 per annum, the usual salary then, *plus* the £30 which would still continue for the evening lectures. Unfortunately I had missed the opening day. He told me I should lunch in the staff room, but added with disarming kindness that I must dress better and develop common interests with the staff. I was to have charge of the 'Qualitative' Laboratory, jointly with Bone. So I went down to the laboratory and joined my colleagues: G. H. Bailey, P. J. Hartog, A. Harden, Bevan Lean and W. A. Bone, who received me with the greatest friendliness and with many congratulations. They were discussing what a demonstrator should do. Lean said he should devote himself entirely to teaching; Bone maintained that he ought to do research; while Bailey insisted on the importance of outside advisory work. Hartog thought there was a case for

all three. Each developed according to his own ideas: Bailey became chief chemist to a large aluminium works; Lean became Head Master of Sidcot; Bone went to Battersea Polytechnic and then to the Imperial College as Professor of Fuel and made it virtually a Research Professorship; Hartog became Chief Executive Officer of London University and afterwards Vice-Chancellor of Dacca University; while Harden had a distinguished research career at the Lister Institute and became a Nobel Prizeman.

The college staff was small, and the little room in the Dover Street House comfortably held the ten or fifteen people that usually lunched at the same time. The conversation was always interesting and sometimes brilliant. Our best talkers were Dixon, S. J. Hickson, Tout, Alexander and Taylor the philosophers. Hickson would generally begin with a story he had 'recently heard', and this would evoke comment or parallel stories. Unfortunately there was no smoking room, so that talks begun at the table could never develop.

I continued to follow up the chemical investigation I had begun on dried substances and rather adopted Bone's attitude as to the duties of the post. Looking back I can see that I was wrong: I ought to have done more teaching. My research work would never have developed a school of research, but I could have been more helpful to the men who passed through my hands. However, they got on well enough. To mention a few: Arthur Eddington began in my laboratory but soon gave up chemistry for mathematics and astronomy (I don't know if it was my fault); Norman Smith, a life-long friend whom I have always held in affectionate esteem, became University Registrar; W. N. Haworth had a distinguished career at Birmingham, and Le Mare did most useful work at Pilkingtons; others went in for technical work or for teaching; I know of none that failed.

I thoroughly enjoyed meeting the distinguished men of science who periodically came to the University to examine or to lecture. Sir William Ramsey came in 1900 to tell the Honours Chemistry students about the new gases he was discovering in the atmosphere. We arranged an ovation; a student who prided himself on his oratory was to make a speech and then would come great applause. Unfortunately the speech was neither 'vetted' nor

rehearsed beforehand.* The orator began by saying that the students 'approved of Professor Ramsay's work', then he began to flounder, said something about 'budding orator', 'first public effort', 'forgot his speech', and sat down in grim silence. But Ramsay was equal to the situation. It was obviously only a male audience but he began: 'Ladies and Gentlemen', then looking round with his inimitable smile—'but I see there *are* no ladies: I too have slipped'. This released the tension and raised a roar of laughter; then came the ovation which was as much for the kindly thought as for the scientific discovery.

On a later occasion I was reading a paper at the Chemical Society in London and wrote asking if I might be shown round his laboratory. I was invited to call and expected to be met by an assistant. To my surprise I was ushered into the room of the master himself, who devoted the whole afternoon to taking me round and explaining the apparatus, the operations, etc. As a demonstration it was a revelation to me, but what most touched me was his modesty and his kindly sympathy for an unknown junior.

Later when I got to Wye I wanted to give an open lecture on the atmosphere and asked him if I might borrow tubes of these gases to demonstrate the glow under an electric discharge. He replied that he had no spare tubes, but he ought to have and would have some put up and lend them to me. which he did.

I spent the early summer of 1898 in Germany, staying a few days with Max, a student friend, at his home at Karlsruhe, then a very attractive little town free from smoke in spite of some factories, and much favoured by artists; the outsides of many of the houses were adorned with pictures. Afterwards I walked across the Black Forest into Switzerland. Much of the old German life remained and I found it very attractive. Fêtes were numerous, the participators wearing rosettes, sashes and corps caps; often carrying banners, and singing. Everywhere the children were polite; there was no begging as in Italy. But everywhere, too, there was interest in Bismarck memorials.

Max's father was a minor official, industrious, efficient and somewhat pompous; his mother was a very kindly and efficient Hausfrau, wrapped up in her home, her 'Mann' and her two

children, Max and Adele—she was frankly anxious that Adele should marry well. They took me with them in the evenings to the Biergarten, where we had our little table; each of us had a long glass of light beer which would last all the evening. They knew everyone at the neighbouring tables; I was duly presented. There was much toasting ('Prosit!') and bowing and laughing and chatting, and meanwhile the band played some good music. It was all very pleasant.

On my return I began again to think about my future. On the face of it this seemed secure enough. My three years' appointment would end in July 1900, but Dixon assured me it would be renewed for a fourth year, and after that I should get a Senior Lectureship if one should fall vacant. My research work was progressing and yielded papers that were well received by the Chemical Society. But was this really the kind of thing I wanted to do? Did I want to lead a sheltered life centring within the four walls of an Institution?

A very trivial incident made me realize that I did not. One bright sunny day when I had just come back from a tramp over the Derbyshire moors I was going along the basement corridor and saw emerging from one of its gloomy rooms a Research Fellow several years my senior. He came out into the light, blinking, looking very old and tired. Suddenly the thought flashed across my mind: do I want to spend my days in a gloomy room and in ten years look like that and still be working on a narrow problem in which only few people are interested?

Other developments during the ensuing months increased this doubt. Bone and I had often talked about the remarkable chemical actions effected by yeasts and other micro-organisms, and we both thought we should like to study them further, but we realized that we must first learn how to prepare pure cultures so that we might know exactly what organisms we were working with. Emil Christian Hansen of Copenhagen had worked out methods for obtaining pure cultures of yeast, and we wrote asking if we could spend the summer learning them in his laboratory. He could not take us but referred us to Professor Jørgensen, a consultant, who had a private laboratory and would be glad to accommodate us. H. C. H. Carpenter joined in, and as our biological equipment was very scanty the three of us

approached Professor Weiss, who with his usual kindness gave us a special course of lectures on the fungi. Early in July 1900 we reached Copenhagen and began our work. We did not, however, want to spend all our time in the laboratory; we wanted also to see something of the co-operative methods then being developed in agriculture and which were already doing much for the betterment of Danish rural life. This was arranged for us by Mr Peschke Koedt, the Free Trade and Liberal Leader in the Danish Parliament, who gave us some delightful introductions; everywhere we were received with a warmth and kindness that deeply touched me and made me always want to go back.

These journeys into the country were far more important than the scientific work. The co-operative methods had not attained the full development of later years, but they showed what good organization could do in enriching country life. I wondered if something of the sort would not be possible at home.

Returning to Manchester I undertook some new social work which made me deeply interested in the problems of slum life. It began with a visit of the Rev. W. J. Clarke of Hurst Street Mission, Birmingham, to Manchester to explain his method of clothing the poor children of that city. Hitherto some of the parents had promptly pawned clothes given to the children by one organization and then sent the children raggedly dressed to another organization for more clothes, and so the process went on. The different bodies worked quite independently, most of them never followed up their activities by proper visits, and they were very successfully exploited. I knew this was so in Manchester, and I remembered a bright girl of ten who had reeled off to me a list of missions and charities within easy reach, together with the booty that could be collected from each: bread, tea and other provisions, clothes, special necessities, money if a good enough case could be put up, day's outings, etc.; the price was usually attendance at some Sunday or week-night meeting, which should not be too spasmodic but need not be too frequent. I was very friendly with her people and used to visit them at about 11.30 on Saturday nights; in an expansive moment the mother showed me a jar full of pawn tickets for the various commodities collected by her numerous bright children.

Mr Clarke recognized that once an article was given there

was no power to prevent it being pawned. So he conceived the idea of vesting the articles in the police and lending them to the parents for the use of the children: they thus became inalienable and could neither be pawned, sold, nor exchanged. The Birmingham Watch Committee agreed, and Mr Clarke and the Rev. S. A. Steinthal persuaded the Manchester Watch Committee to do the same; so the Police Aided Association for clothing poor children was started. I became an active member, taking charge of a very poor slum now entirely cleared, near the Medlock Street gasworks.

The method worked admirably. A few parents tried pawning the clothes, but they were promptly prosecuted and punished: on receiving the clothes they had signed a declaration to the effect that they fully understood that the clothes were on loan only and could not be disposed of.

I found the people extremely interesting. Drink was their main trouble; the district swarmed with little beer-shops out of which they could never keep; there was also a corresponding number of pawnshops. The men rarely worked more than half-time, they were carters or casual labourers, and few earned as much as 25s. per week. Others worked on their own account. Chip chopping would bring in a net return of 1s. to 2s. per day; one cwt of waste wood could be bought for 1s. 6d. or 1s. 9d.; it would yield 250 bundles selling at 8s a shilling at the shops, or five a penny retail; cartage and string cost about 6d. The profit was enhanced if, as often happened, the children stole the wood. Some sold matches bought at 6d. per dozen boxes and sold at 1d. each; sales might be one or two dozen per day. Others had barrows and sold stuff from the market. Some drifted into the army—then the easiest refuge for a workless shiftless man—but few could keep work of any kind.

Families were large, but the death-rate of the children was considerable, tuberculosis being even worse than in the Renshaw Street district. At times most revolting things would happen when a drunken father came home. Beatings of the wife and children were common: I rarely left the district till 1 a.m. on Sunday morning and often found a shivering, crying child waiting for me at a street corner, asking me to go to the house and pacify the drunken father. One of the most dreadful nights of my

life was spent at the bedside of a man dying of delirium tremens: he raved as he saw snakes climbing up the walls and coming towards him, and he implored me to protect him against them. There were stories of much worse things happening. Venereal disease was not then treated as it is now, and there was a belief, said to be sometimes put into practice, that the safest cure was association with a child of twelve or thirteen. I was positively assured that cases had happened, but could never get sufficiently good evidence to put before the Society for the Prevention of Cruelty to Children.

The men were often in trouble with the police, and they were not infrequently in prison for short periods. This involved no social stigma: 'he is away', would be the answer when one inquired. For my special group I could usually arrange that the family had food, fuel and rent during the enforced absence. They did not always know why they were 'put away', nor did they seem specially to resent it; they accepted it as part of the natural order of things.

Some of the women were worse than the men—a really bad woman can be revolting; in general, however, they put a better face on things, and contrived either by work or by dint of skilful manipulation of the pawnshop, the local missions, and charitable bodies, to keep some semblance of a home. One entertaining lady sold matches from a tray and had her regular post on the way to the station; she found it most profitable to label herself 'Blind'. Rents were low, mostly about 4s. weekly, and almost always in arrear. Sometimes in desperation the landlord would have recourse to the law, but this was rarely profitable. Often on Saturday night after the closing of the beer-houses had brought all the family home, frequently in jocular vein, have I been regaled with stories of the outwitting of the bailiff's men. They could not lawfully force a way into the house, but once there they could take furniture except beds and tools. At times there was a regular siege and various devices were adopted for getting the people out. One bailiff blocked up the chimney by putting a stone slab on top, then he removed some slates to let the rain in. Another, taking advantage of the momentary opening of the door, stripped it off its hinges and removed it so as to make the house uncomfortable. Windows also would be taken out. In the

end, especially in winter, the people had to go, but they often put up most ingenious defences before they did. It was often a Pyrrhic victory, for the furniture was not infrequently unsaleable, sometimes consisting of little more than empty boxes: in any case the neighbours were unhelpful.

The ingenuity of the people was considerable and often the subject of much mirth. One household lost its only jug, so sent its basin for the beer; this got broken, so the teapot was sent and the beer drunk out of the spout. Another family, lacking these resources, sent an empty meat tin which one of them had discovered.

The people saw and appreciated the humour of these things, while admitting in better moments that they were all wrong.

They were extremely unreliable. I often found work for men, women and boys, but they rarely kept it. Nor was provision made for coming events. A baby would be born, but no garments were in readiness; one baby had had to be wrapped in the husband's big red handkerchief till a kind friend intervened. Provision of district nurses was beginning, and some of them had gruesome stories to tell.

Some of the boys had a marked desire for adventure, which showed itself in a passion for staying out all night and at times they would sleep in most unsavoury places. They had, too, a keen sense of humour. 'What did your father use to do?' I asked an orphan boy: 'He used to get drunk' was the answer, with a twinkling eye.

But some of the daughters were magnificent and made heroic efforts to keep the home together in spite of a drunken father and an unsatisfactory mother.

The children were very affectionate and were very fond of them; I used to take parties out by train on Saturday afternoons into the country. And I liked the parents, too. The whole group, men, women and children, had quite definite standards of honour. Nothing known to belong to me was ever taken, nor was I ever assaulted by a drunken man even on Saturday nights when intervening to stop him beating his wife. Only twice did I hear of insinuations against myself and they were by people 'in drink'. Without anything being said to me, the offenders were faithfully dealt with: one got a thrashing; and the other, an

elderly woman, was thoroughly scolded; I happened to hear some of this and was both grateful for the friendly defence and lost in admiration of the pungent and forceful language in which it was couched.

In view of their many good qualities I was puzzled by the failure of these people to get on, and I tried to discover the reason. Most of them were Catholics, descended from Irish refugees who came to Manchester in the 1840's to escape the Famine. The first comers had settled east of Oxford Street in a district that became known as 'Little Ireland'. Some had brought pigs and kept them in their houses till this was forbidden. They had intermarried with English people and were now very mixed, but at no time, so far as I could discover, had they been completely self-supporting. In each generation individuals had succeeded in rising and had gone elsewhere, but there was always a considerable residue that had to be maintained by charity or out of the public funds. In their better moments many of them wanted to get out of the bog in which they felt themselves caught, but they did not see how to do it. 'Can't you get me to Canada,' one man said wildly to me as he was being taken off to prison, 'or somewhere where I can work with horses; I am a horseman and I should be all right there.' I tried but failed; his record was too bad. But I felt convinced as the result of many long talks with both men and women that the fundamental cause of their trouble was their inability to adapt themselves to the conditions of town life. This seemed to me to point to a way out. If only these mal-adjusted people of the city could be brought into the country they would, I thought, be able to start anew and they and their children would have much better chances than if they simply remained where they were.

I knew nothing about country life in England, but I remembered the little farms of Wales and how vastly better the people lived there than in the Medlock Street, even than in the Renshaw Street district. And I was deeply impressed by the results of the Danish co-operative methods, which seemed to open the way to a full and satisfying country life.

So I conceived the idea of establishing an agricultural settlement, to which people who had failed to make good in the towns might come; where they would learn to become agricultural or

rural workers, and then get posts on farms or in villages. I should myself go out and take charge.

The more I thought of the scheme the more I liked it. There were two major difficulties; I had no money and I knew nothing about agriculture; but if I could get a post at an agricultural college I could acquire the technical knowledge, and once this was done I thought I could proceed with my settlement scheme.

In October 1900 the Chemistry lecturership at the Wye Agricultural College became vacant and I decided to apply. Dixon was discouraging: there was no career in agriculture, he said, and good men did not go to agricultural colleges; if I stayed where I was I should certainly get on and in due course gain a Chair. But he saw that my mind was made up, and he said that Wye had an excellent Principal, one of his old students, A. D. Hall: if I must go in for agriculture it was the best of the colleges and he was pretty sure I should get the post. Perkin was rather amused at my wanting to go. He was one of the Governors of the small Agricultural Institution at Holmes Chapel, Cheshire, and was not at all impressed either with his fellow Governors or with the possibilities of the profession. 'If you really want the post,' he said, 'you must turn up at the interview in a frock coat and a tall hat, otherwise an Agricultural Committee will not look at you. But are you really sure you want to go?'

His advice seemed sound, and although I possessed neither frock coat nor tall hat I reflected that I should certainly need them for a wedding or a funeral, so I bought them and applied for the post. I was called up for an interview, and was greatly attracted to A. D. Hall. The Manchester veteran chemist, H. E. Roscoe, was in the Chair; a few kindly questions were put and I was offered the appointment.

I returned to Manchester and reported to both Dixon and Perkin; the latter asked: 'Did you wear the tall hat and frock coat?' and being assured that I did he added: 'It was that that did it.'

My work at Wye was to begin in January 1901; I had two months in which to clear up at Manchester. I tried to finish my investigation on the rate of oxidation of phosphorus but did not quite succeed; also some work with J. W. Mellor on the combination of hydrogen and chlorine was incomplete. I intended

to come back in the vacations to finish these and then to put in for the London D.Sc. This intention of coming back took the sting out of the parting with my friends at Renshaw Street and in the Medlock Street region. And finally, a few days before I left Manchester, Elnor Oldham, one of the workers at the Mission, promised to become my wife. She had come to us from Platt chapel. Her father, Walter Oldham, descended from Hugh Oldham, the founder of the Manchester Grammar School, had gone out as a young man to Singapore where he met and afterwards married her mother, Elnor Brennand, daughter of a merchant, and a descendant of Elnor Radcliffe of Foxdenton Hall, Radcliffe, Lancashire.

Some months later I obtained the London D.Sc. degree.

CHAPTER VII

From Chemistry to Agriculture *Wye College 1901-1907*

I was met at Wye Station by one of the lecturers, who took me to dinner at the college. Its beautiful fifteenth century refectory, its panelled library and charming quadrangle greatly impressed me. It had been founded in 1447 by Archbishop Kempe for twelve poor priests and taken for agricultural use in 1894; the first principal, A. D. Hall, had added laboratories, a lecture room and living rooms for the students. For its time it was well equipped.

There had, of course, been initial difficulties. Some farmers did not want 'professors' to come and teach them farming; some committees did not share Hall's long views. But Hall successfully overcame them. Minor troubles included the question of gas supply. The miniature gasworks had sufficed for the village needs, but the college consumed so much that on Church Service nights the stock was exhausted by 9 p.m. and people either had to go to bed or light candles. But the necessary adjustments were made.

Then, too, the college, feeling it had a duty to the residents of the village, invited them to special lectures. No exception was taken to the young men and the older people going, but many objected to the young women attending. 'In my young days,' a lady told us later, 'young women would have been content to stay at home and help their mothers without wanting to run about to attend lectures'; while one of the workmen, telling me of the old days, was particularly severe on a family of three daughters who not only attended assiduously but *took notes*. 'Reg'lar mannish young women they was,' he said bitterly, 'must 'ave their notebooks like any man.'

A fortnight after my arrival came the news that Queen Victoria was dead. It is impossible for me to convey any idea of the

shock this gave us. We were simply benumbed. Work was out of the question: all lectures and classes were cancelled; the church bells were muffled and tolled out strange but beautiful music. I went for a solitary walk over the Downs, the sound of the bells in my ears for a good part of the way. At lunch we talked in hushed voices and then went our separate ways. We knew that this marked the end of a great period: the future would be different, though in what way we could not tell, but the certainty and solidity of the Victorian days had gone, we feared for ever. The Boer War had shaken us, and this completed the catastrophe. What would happen we did not know but we were haunted by anxious fears.

I got to know Hall very well and I had the deepest respect for him. He was perhaps the most widely-cultured man agricultural science ever had; he represented the Balliol tradition at its best, and whether the subject was art, literature (especially poetry), music, or crop production, he was equally at home. He was a remarkable gardener, recognized as a judge and craftsman by the Royal Horticultural Society, the Rose Society, the Tulip Society, and the Sweet Pea experts; he grew fruit to perfection, though he was not interested in garden design. His charming and attractive personality, brilliant conversation and shrewd judgment of men and things made him a welcome guest in the great country houses where life was still gracious, while his kindly sympathy opened the doors of the humbler folk—and equally important, of the students' rooms. I owe a great debt of gratitude to him for much help in those early days.¹

F. B. Smith, the Vice-Principal and Professor of Agriculture, also helped me greatly. I went to Wye a raw 'leftist' townsman, knowing nothing of the countryside, looking upon landowners and squires as enemies of the people who ought to be eliminated, and upon farmers as an ignorant lot of men who underpaid and ill-treated their workers. But Smith put me right on these matters; he gave me endless instances of landowners, squires and farmers who recognized to the full their responsibilities for their village and their workers and were far better employers than

¹ I have given fuller accounts of Hall in the *Obituary Notices of Fellows of the Royal Society*, Nov. 1942, Vol. 4, pp. 229-250, and the *A. D. Hall Memorial Lecture*, March 1954, Occasional Publication No. 6, Wye College.

many of the mill-owners and warehousemen I had known. In due course I met many such men myself.

Another to whom I owe much was John Percival, Professor of Botany. We first met in the carpenter's shop: he, always the teacher, picking up two bits of wood, explained the difference between heart wood and sap wood. I was very interested and asked where I might learn more. 'In my book,' he replied. Very tactlessly I said: 'Have you written a book, then?' I thought he would have exploded. 'Good night! man!' he exclaimed, 'Have you never heard of my book *Agricultural Botany*?' I pleaded that I was a stranger to agriculture but would certainly make its acquaintance: it was in fact the best and most interesting book on the subject and he was justifiably proud of it. He was a shrewd naturalist and a good walker, and he and I went many long tramps over the Downs where he taught me about the trees, the grasses, flowers, fruits and birds. He was also a wonderful collector, and from many sources obtained seeds of important species and varieties of wheat which he grew in order to make up sets for distribution. The labour was prodigious, especially near harvest time when birds flocked to plunder the grain and he had to be up at 4 a.m. with his gun to keep them off; he had as yet no bird proof cage.

Yet another helpful colleague was K. J. J. Mackenzie, a grand man, of Highland descent from a long line of soldiers, but debarred from the family profession by an accident at football which damaged his leg. So he took to agriculture, but the fighting spirit was always there, ready to break out against authority whenever some action was contemplated of which he could not approve. He was a Catholic of very high principles, and when afterwards he was promoted to Cambridge he took exception to the attendance of women students at his lectures, and particularly to their participation in the genetical experiments which Bateson and Punnett were then popularizing, and which involved their supervising the mating of rabbits and poultry. There was a story of one tea-party where he reduced his hostess to tears by his outspoken condemnation of the genetical activities of some of the ladies present. But a kinder and more trustworthy friend no man could ever hope to have.

My private purpose at Wye was to learn as much agriculture

as I could in the shortest time so that I could get on with my scheme for bringing out the unemployed and the slum-dwellers from the town to the country. At the same time I wanted to keep in touch with both the Renshaw Street and the Medlock Street people, especially the children, and also to complete some unfinished research work at the Manchester University with a view to putting in for my London D.Sc. Part of my life, therefore, was centred at Wye and part at Manchester: it was a sort of double existence. At the end of term I would leave Wye by the afternoon train, reach Manchester Central at 10 p.m., be met at the foot of the steps by a little group of ragged urchins from the Medlock Street district and taken to some of their homes. There I would learn the latest news: births, deaths, marriages, who had got into trouble with the police and why—if this was known. About midnight I would be in my lodgings where my kind landlady had left some supper for me. Next day I would go to the college to meet my colleague, J. W. Mellor, and plan our work for the vacation; this occupied the whole of each working day. The evenings were spent in the Renshaw Street and Medlock Street districts. So the vacation passed and I returned to Wye.

In order that I might better and more speedily learn agriculture I attended Smith's farm classes, and supplemented the instruction by making friends with the actual workers, the shepherd, the ploughman, the stockman, etc.; often I went round with them while they were at their work. I soon realized the great complexity of farming; the long years of practice needed to acquire the craftsman's skill. Even gardening I found was no simple matter: in order to learn it I took an allotment in the village allotment field and worked alongside the village gardeners. Their activities seemed effortless: mine were painful and laborious, yet they always beat me in the result. Try how I would I could not grow raspberries like old Mr. Lusted. One day he let me into the secret. 'I had a donkey,' he said, 'and he died: I buried him under them raspberry canes and that's why they do so well.' As dead donkeys were well-nigh impossible to come by I felt that he had an unfair advantage over me. He was a fine old man, well over seventy, and had in his youth been a soldier serving under the Duke of Wellington but did not like

him: he found him a very hard master. He was on duty at the burial at St Paul's in September 1852, and often told me how his helping to bury the Duke was 'the best day's work I ever did'.

It was my growing acquaintance with the farm workers and gardeners that showed me the futility of my scheme. Old Barrows, the shepherd, had a considerable flock of the big Romney Marsh sheep, then the most popular in Kent except on the Downs. He took intense pride in them and in his management, and with his crook would periodically pull one of them out so that I could handle it and learn its 'points'. One cold day in spring we were looking at them; they were facing our way and I was admiring their heads with the tuft of wool hanging over the forehead. But that, he said, was the wrong way to look in such weather; instead he took me round and invited me to contemplate their 'clean bottoms' as he put it, which showed that they were free from 'scouring', i.e. diarrhoea. That, he said, is the test of good shepherding.

He had been on the farm for many years, and he told me that, as a boy, he and his mate were allowed a day's holiday a year between them on the occasion of Wye races, then held in a coomb in the Downs above the farm. So they tossed to see who should get the holiday, and the one who lost had to wait till next year to try his luck again. The work of the farm, he said, must go on, holidays or no holidays.

His son was the ploughman, and many times as I went round with him I admired the way he could manipulate his cumbrous heavy plough, and later, with lighter implements, could work down the soil to a proper tilth. Then there was Goldup, the stockman, one of the kindest and gentlest of the group: proud of his herd and ready to take any amount of trouble over them, he would stay up far into the night watching and ready to help a difficult parturition.

I was deeply impressed by the sense of responsibility shown by these men. The soil and the animals must be cared for: at whatever cost of labour and trouble the fertility of the soil must be maintained, and the sheep, the cattle, the pigs and the poultry must be kept in good health and in good productive condition. Also I learned how hard was the life of the smallholder. I had

had visions of setting up some of the townspeople as smallholders, but Measday's example convinced me that this would be quite impracticable. He had a smallholding of which he was rightly proud, but he was working on it for all the hours of daylight in autumn, winter and spring, and for most of the hours in summer. He was bent and prematurely aged and would have had an easier life as a farm worker, but he prized his independence and would on no account give it up.

All this set me thinking. The chief defects of the unemployed townsman, and particularly of the slum dweller, were his very slight sense of responsibility, his inability to work steadily, his inefficiency and his lack of interest in work. The distinctive features of the good agricultural workers were their sense of responsibility, their capacity for steady work, their efficiency and their interest in their work. They might do it slowly, but they kept at it and got the job done. I saw that unless the townsmen could first acquire these qualities their chances of succeeding in the country were very small. Thinking still more deeply I saw that I had got the problem in the wrong perspective: I had regarded the slum-dweller as the victim of his environment, and thought that if this could be changed all would be well. I now saw that the fundamental problem was not material, but spiritual; that what was wanted was not a scheme such as I had thought of, but a change of life such as the Salvation Army and the best of the missions were trying to bring about.

I still think that this is so, and for that reason I never took any part in the numerous schemes put forward from time to time for settling the unemployed from towns and cities on the land. It is true that unemployed from industrial villages, who have keenly tended their allotments, may settle down in some co-operative agricultural or horticultural scheme, and, as the Land Settlement Association caters for people of this type, I joined them much later. But the possibilities are distinctly limited, and in my view agriculture offers no large-scale solution of the problem of town unemployment.

So I abandoned my scheme. I had now to decide my future course. I could not go back to the Manchester University: I felt I had burnt my boats. I thought of taking a post at the Technical College either there or in Salford, and there was the possibility

of a post in Leeds. Any of these would have enabled me to continue social work among poor children. But I did not feel equipped for the spiritual activities which I now believed to be essential. I was in a very real difficulty.

Quite imperceptibly I began to be interested in agriculture and agricultural science apart entirely from my scheme. I liked the staff, the students, the farm workers and many of the farmers I had met. I saw, too, with deep regret, that agriculture was not prospering: wages were low (our men earned only about 18s. per week¹), men were leaving the farms, land was being laid down, or more often allowed to tumble down, to grass. All this meant a movement of agricultural workers into the towns to make the problem of unemployment still more difficult. There was practically no poverty in the village itself; adults and children were alike well dressed and sufficiently fed because of the various additional sources of income. But in some of the outlying cottages where additional money did not come there was real discomfort. coal, for instance, cost 25s. per ton in Wye, and although some wood was available it not infrequently happened in winter that the whole family had to go to bed at 9 p.m. in order to keep warm.

I felt that science really ought to be able to help agriculture but I was greatly dissatisfied with the presentation given in the current text books; it was the science of the 1880's and not of 1901. Not only was it antiquated but there seemed little possibility of introducing new ideas such as science is always producing. Here there seemed to be scope for a really useful and practical life's work: to build up an agricultural science that would be closely linked with pure science, so that even the latest and most abstruse developments, if they were likely to be helpful, could be embodied: and to put this science into such form that

¹ The bailiff had 23s. per week with cottage and coal; the stockman and shepherd 20s.; the waggoner and ploughman 18s.; in addition the elder ploughman got his cottage free; the labourers 16s.; old men 12s. in summer and 10s. in winter; while boys started at 5s., all per week. The skilled staff had also a bonus of £3 at Michaelmas if things had gone well, and of £1 at harvest. Wives and children earned a good deal at fruit- and hop-picking and this paid for clothes, boots, etc.

Farm hours were 6 a.m. to 6 p.m. in summer, with twenty minutes for breakfast and one hour for dinner. But the waggons came at 4 a.m. There was no Saturday afternoon off, and no holidays. Winter hours were daylight to dark. On Sundays the animals had to be fed, for which 1s. 6d. was paid.

teachers could use it in their educational work, experts could use it in their advisory work, and research workers could use it in gaining new knowledge and developing new methods. Hall, always the pioneer, was trying to do this for the soil, but I wanted something more closely linking pure science with agricultural science, and I felt sure it could be achieved.

I did not, however, wish to cater exclusively for the high specialist. I wanted to get down to the workers, though I could not at first see how to do this. The opportunity came in the summer vacation. Part of my job was to lecture to country schoolmasters collected for a two-weeks' course; it was left to me to make my own programme. In my first year I gave them the sort of thing that might be expected from a young man fresh from a good University: something about recent advances in science. But I soon saw that this was not at all what they wanted: they were, of course, too polite to say so but I felt their disappointment. I could not risk a repetition, so I called in the village schoolmaster, Mr Ashby, to my aid, explained that I had made a mess of the course and did not want to do so next year, and asked if I might go to the school one afternoon a week to give a lesson so that I could discover for myself the possibilities, and by a system of trial and error work out something that would be of real value to the teachers. The idea was not entirely novel, for Hall had already given some 'Nature study' lessons there. I did not want to do this, for 'Nature study' was entering a rather sloppy sentimental stage; we heard, for example, of a teacher talking about 'pretty girl lily and naughty boy snail'—though it afterwards became much more realistic.

Mr Ashby at once consented, got the permission of his managers and his inspector, and I duly started.

My course was virtually a survey of the district so far as the children knew it. Why was the village built where it was on the river, and not half-a-mile higher up or lower down? The boys knew from paddling (not always lawful) that the bridge stood on the only place where the bottom was firm enough to allow the stream to be forded. Why did the roads run in a roundabout way from our village to the next? Why were some fields always in grass and others kept in arable? No mere guessing was allowed: every good suggestion was tested by experiment, using

home-made apparatus within the range of any village school. The course delighted the children—indeed they were so pressing with their questions that if I wanted to get the 4.30 train I had to avoid passing the school. It proved very useful to me afterwards.

Hall left Wye for Rothamsted in the spring of 1902, and the new principal, M. J. R. Dunstan, handed over to me the whole of the agricultural chemistry, practical and theoretical. This enabled me to experiment with the building up of a course that would admit the infusion of modern science. I took great pains in the preparation of my lectures, often spending hours over a single one, and never using the same lecture twice. Gradually the course grew up, and later on it formed the framework of my book *Soil Conditions and Plant Growth* of which I shall say something later.

Now at last I had a worthy task that would absorb all my energies, and would abundantly repay all the effort I could put into it.

It was about this time (July 1902) that I first saw a lady smoking a cigarette. She was an old friend whom I had known from her childhood and the occasion was a Stratford Sunday School 'treat', she being one of the teachers. I was struck dumb, and when I recovered my speech I implored her to stop. She did and I destroyed the cigarette, but for some time I was a disillusioned man. But worse was to follow. I was invited out to dinner at a higher social level than I had ever before attained and to my astonishment found my hostess and her lady guests in garments that left arms, shoulders, and something more uncovered. At Aberystwyth the women students had always been fully clad from wrist to chin and chin to toe: never before had I seen ladies with such a lack of cover (I had never been to a college dance, and did not know what was worn there, but Miss Carpenter was very strict). The Great Queen is dead: what are we coming to? I wondered, and I was so perturbed I wrote to Elnor about it.

There was considerable excitement in Wye when in February 1903 our village poet, Post the jobbing gardener and odd man,

published a volume of his poems. Percival arranged this; he had recognized their merit in spite of their crudeness. Only slowly did publishers learn that much talent lies undiscovered in the English villages.

In September 1903 I went back to Manchester to wind up the investigations at the college and to say goodbye to my friends at Renshaw Street and in the Medlock Street region. Already the latter were being scattered: the corporation had condemned the worst streets and were pulling down the houses; it would have been quite impossible to keep touch with more than a few of the families and it seemed that this part of my former activities had come automatically to an end. Further, the boys and girls at Renshaw Street were growing up into young men and women; many of them, thanks to their sterling merits and the help we had been able to give, were well on the way to a happy and successful life. I felt reconciled to giving up my social work in the town and was ready to throw myself whole-heartedly into my new work in the country.

I had no subsequent time or opportunity for doing social work, and I never afterwards lived anywhere near either a Renshaw Street Mission or a Unitarian Church. So we attended the village church which after many years we joined, though without losing our affectionate interest in our old friends. Nor did I take to politics; the purpose I had in mind absorbed all my energies.

My last act before leaving Manchester was to marry Elnor Oldham on September 15th, 1903. The ceremony took place at Platt Chapel which Elnor had attended from her girlhood, the Rev. Charles Poynting officiating. Afterwards we went to London for a few days and then to our new home at Wye, a comfortable house that I had taken over from one of the staff. We spent many happy hours in the autumn in arranging and re-arranging our rather small stock of furniture and remaking the garden. My income was £200 per annum plus about £30 in various extras. Our rent was £30, but income tax, then 11d. in the £,¹ hardly touched us. Custom required, however, that we should keep a maid, but a little one not long from school would

¹ The National Debt was then £10 per head compared with £536 in 1954.

serve; her wages were 2s. per week,¹ and her mother made her uniform. We grew most of our own vegetables and fruit; my wife very successfully kept bees and traded surplus honey for groceries. Food was cheap² and we lived very comfortably.

In the early 1900's Wye was a very attractive village—it had in bygone days been a town, but had lost that status. Its population was about 1,200, divided sharply into two groups: the agricultural workers and the craftsmen, who with their families made up the major part; and the retired ladies, usually relatives of prosperous agriculturists. The college was something apart and had no share in the village life.

The retired ladies formed a group which was more like the Cranford society than any I had met before or since. Nearly all lived in genteel poverty; all, as in Cranford, had to practise elegant economies, yet each household had to keep a maid, if only a little one, for it would never have done for a lady to do her own work. The ladies wore black silk frocks and white lace caps, and they were full of knowledge of the doings of everyone in the village. One who lived near to us used to sit just behind the curtain of her front room window where she could see everyone who passed without herself being observed. She knew every new frock and hat in the village. They were very sociable and entertained each other to tea; Elnor and I were often invited. We would assemble in the stiffly furnished drawing room, which, however, often contained an attractive piece of furniture, a relic of better days; the little maid would carry in the tray and tea would be handed round. An invariable ingredient of the meal

¹ Her older sister, trained and experienced, got 7s. 6d. per week, i.e. £10 10s. per annum.

² My wife has given me from her account books some of the prices of food during the period 1903–1907 when we were at Wye: •

Mutton, per lb.: Leg 10d. Loin 9d. Neck 6d.

Beef, per lb.: Steak 9d.–11d. Skirt 8d. Shin 7d.

Veal, per lb.: Neck 6d.

Pork, per lb.: 7½d. •

Butter, per lb.: 1s.

Eggs, each: ½d. for about 3 weeks in spring; rising to 1d.

Woodpigeons, each: 8d.

Sugar (golden crystal), per lb.: 1½d.

Fruit, per lb.: cherries, gooseberries, apples, about 2d.

was a plate of penny buns, made by Brenchley the baker: it was *de rigueur* to praise them as if we had not tasted them before, yet we had them at every house and we gave them at all our return parties. Little ever happened in the village yet somehow it gave occasion for plenty of talk, and conversation was lively and general. The subjects were limited as the ladies practically never travelled, read very little if at all, and interests were narrow, but the talk was free from malice and quite pleasant. One of their favourite occupations was the knitting of crochet lace, then much used for edging tablecloths and mats, pillow slips and face towels. Needlework also flourished.

We had, of course, our tragedies. Three elderly sisters in a house on the outskirts of the village: they were extremely methodical in all their ways. Regularly they attended church, sitting always in the seats they had occupied for years. One Sunday they arrived and found their seats taken by strangers, whom a negligent verger had failed to direct elsewhere. They promptly walked out of the church and never again entered it. They shut themselves up in the house, and only one ever came out—a timid, solitary figure flitting down to the shops in the evening when any change in the orders was necessary. No one was ever allowed to enter the house, not even the vicar—once only he got in, but never again. Food, coal, etc. was delivered but no tradesman's boy ever saw the inside of the place. The garden was allowed to grow into a wilderness, and at the time of our arrival had become a kind of natural stockade round the house. Not till first one and then the second sister was on the point of death was the doctor admitted, and then the sole surviving sister shut herself up till for her, too, the end came.

There were very few menfolk in this upper class, and they were never to be met at the tea-parties. The squire lived about a mile away. His big rambling house had been built by a predecessor who had been quite a character and many were the tales about him in the village, not all suitable for repetition. He had sat in Parliament, well-nigh ruined the estate by building and furnishing the house and making a collection of pictures of very unequal merit. Before he died he had an equestrian statue of himself made to go on his grave, and he had in the undertaker's men to rehearse the carrying out of the coffin. But the Bishop

would not allow the statue, in the churchyard and so it was set up in front of the house.

We had plenty of interesting neighbours in the district.

In an adjoining village lived a clergyman of the old school renowned for his dinners and his excellent port, but a bottle once opened had to be emptied and on no account could a visitor allow the decanter to pass him. At the same time guests had to be able to 'hold their liquor like gentlemen', and no lapse from self-control was permitted. One of our colleagues fulfilled all requirements and was a frequent guest; from him we learned that, as the old gentleman grew older, one of his chief preoccupations was that *either* he would die before his stock of port was finished, in which case it would get into the hands of a younger generation who could not appreciate it; *or* it would be finished before he died, in which case, as no more of like quality was obtainable, his closing years would be clouded by his having to drink inferior port.

When he died about a dozen bottles were left.

There was another clergyman in a very isolated little village a few miles away that we sometimes called on: the isolation and lack of society had told heavily upon him and he had taken to secret drinking. His only child, a daughter, gave up her whole life to her father and strove in every way to hide his failings from those in authority.

The college ran the usual sports, but the village had its own in which the college shared. Whenever the East Kent fox-hounds met at or near Wye all work at college ceased except the most vitally essential, and all forgathered at the meet.

Another great day, which, however, came only once a year, was for the point-to-point races. This was quite free from any professional element, and there was no open betting; it was purely a social friendly gathering. The riders were mostly farmers or other countrymen on their own horses: among them was a hunting clergyman from a neighbouring village who rather shocked some of our spinster ladies because he called his horse 'The Bishop' and moreover the race was in Lent. Of course he lost it.

Of all the neighbouring farmers that one that helped me most was Alfred Amos of Spring Grove. Politically he stood apart

from the other farmers, being a Gladstonian Liberal and a Free Trader while all the rest were Conservative and Protectionist. But he was a first-class farmer and owned the land he worked; he was one of a family of great farmers who between them owned and successfully cultivated large areas of East Kent. I spent much time with him on his farm taking notes of which I made use then and later: inspecting the hop garden, the fruit, the flock of Kent sheep, the arable crops and the pastures and meadows. In spite of his very wide range of farming, everything was well done. Happily his son, after a successful career at Cambridge, elected to follow him and the fame of the farm was fully maintained.

Part of my duty was to give lectures to farmers. We specially nursed Surrey, which contributed liberally to the college and always felt that it did not get value for its money. So I visited many of the Surrey farms, always arranging, if I could, to spend the night locally so as to have a clear day's farming. As always, I took full notes which I still possess. Farmers near London produced milk; those farther off grew potatoes and also mangolds and hay which they carted into London to supply the numerous cow- and horse-keepers then living there; they brought back loads of stable manure which they put on the mangold ground, obtaining enormous crops—up to 8½ tons per acre—as a result. On the lighter thinner soil sheep were kept, not for lamb production, as at present, but for mutton between November and Easter.

I also had to lecture to gardeners. On one occasion when I had endeavoured to explain some of the phenomena of plant growth in simple language, the proposer of the vote of thanks very kindly commended my efforts. 'The lecturer,' he said, 'as been hintelligent, but not too hintelligent for us.' Often the lecture had to be given in the club room of a public house or hotel. The day chosen was market day, that being the time when most farmers were in town. The time was usually 4.30 or 5 p.m. Wherever one of the schoolmasters who had attended our summer courses lived near, or where there were some of our good farmers, we were sure of an audience. But at times we were strangers in a strange land. The farmers had had a long day; many had started early for the market in their dogcarts, and

they were tired. I have turned up punctually and found no one present: after about five minutes the secretary appeared and explained that we must 'give them time'. After about ten minutes he would go into the bar and collect a group who had every intention of coming, but in the meantime were assuaging their present thirst and the thirst they expected to acquire during the lecture. We would start twenty to thirty minutes late; after forty minutes I had to stop, the audience could stand no more.

My activities at the school put me in touch with the parents and gradually I got caught up into the village life. My first appointment was as Chairman of the Honey Producers Club, which met monthly at a local public house, nominally at 7 p.m. But as there were three clocks in the village—the church, the station and the Post Office—all telling different times, we had to wait till ten minutes after the last clock had gone seven before we could start. I then discovered that my chief duty as Chairman was to stand drinks to the rest of the committee, some half-dozen lusty fellows who could have consumed a great deal. As our finances would not stand the strain I had to resign before the next meeting.

I was more fortunate in my appointment as one of the Managers of the Infant School at Wye and of the school at the next village, Brook. Our powers were very restricted—we could see that the schools were kept clean and spend sums up to 9d. but not much more; in consequence I could never get all that I wanted in the way of equipment. When I proposed that we should make a great effort to obtain a piano for the Wye school, the chairman asked: 'Have other schools in the district got pianos?' I had to admit they had not. 'Well then,' came the reply, 'we want to be as good as our neighbours, but we don't want to be better', and that ended the matter.

Another time, when we had had outbreaks of ill health and other troubles among the children, Hall looked into the matter and discovered that the main sewer was of brick and so badly constructed that sewage could easily leak out into the gravel patch on which the village stood and so into the wells—there was then no piped water supply. Hall called a meeting of the village elders and urged them to get the sewer made absolutely watertight. But it was in vain. At gardening and the management of

fruit and hops they were really splendid; but here: 'Other villages get throat troubles and fevers and such like, why shouldn't we?' was the line they took, and from this nothing would move them.

Later, on, however, the County Council intervened. They examined both the water supply and the sewerage system and condemned both. We were given the option of putting forward new schemes or accepting theirs, but do something we must. The villagers protested: they had drunk the water and used the privies for 40, 50, 60 years, etc. and were still hale and hearty, what need to do anything? But the County Council remained adamant and reform set in.

Some time later I received a postcard from father, the shortest he ever wrote me, with five letters only: 'E.T.R.: B.A.' But it concealed a long and happily ending struggle. His two years at the Brough Road College gave him no letters after his name and he soon discovered that this was a handicap. Certain organizations in the United States awarded a 'D.D.' to persons in my father's position: they would write to one saying they had heard favourable reports of his work, and if he cared to send some of his sermons for examination they would consider conferring the degree upon him. There were of course fees and charges but when these were paid the parchment was duly forthcoming. Others would join one or more of the learned Societies which were then beginning to expand, and which accepted an expression of interest as sufficient qualification for membership; they could then sign themselves 'F.R.X.S.', 'F.Y.S.'

However, father refused all such devices and boldly decided to gain a University degree. London and Dublin (Royal University of Ireland) gave external degrees, and as the Irish degree was the more convenient to work for, he aimed at that. The postcard showed that he had succeeded.

We were very happy at Wye: we liked the staff, the students, and the village people. On fine days when I was not working we would explore the beautiful countryside on our bicycles; there were practically no cars about and the little towns and villages were as yet unspoiled. On wet days we would poke about in

Stonham's old furniture store and perhaps find something that pleased us. I became a keen gardener and rose grower, showing at the local shows which were then very popular, and I was very proud of the medal I won at the great Canterbury Show. Our fruit also was flourishing; the gardener who supplied the trees had said: 'What you want is happles next year, not happles in ten years time.' And we got them.

I started several investigations and became deeply interested in them. They included the chemical changes during the making of silage, the losses in making farmyard manure, and, most fertile of all, oxidation in soils. This last was a continuation of work I had done at Manchester on the oxidation of phosphorus: I finished it at Wye but before disbanding the apparatus estimated the rates of oxidation of various soils. They proved to be of the same order as productiveness. This did not surprise me: the production of plant food was currently attributed largely to the action of soil bacteria, and I found that sterilizing the soil greatly reduced the rate of oxidation. But on one occasion by an accident the sterilization was only partial; the rate of oxidation to my astonishment went up, and so did the soil productiveness. Partial sterilization had increased the production of plant food, but I could give no explanation.

Meanwhile our family was growing, my total income was only £280 per annum and I was getting anxious about the future. I was seriously thinking of going to South Africa as Chemist to the new Department of Agriculture that F. B. Smith was setting up at Pretoria under Lord Milner when Hall invited me to Rothamsted. The Goldsmiths' Company had given a capital grant of £10,000 as an endowment for Soil Research. The interest on this, together with sundry other small items of income, enabled the Lawes Agricultural Trust Committee in March 1907 to make me a formal offer of £400 per annum to become the first 'Goldsmiths' Company's Soil Chemist'. This I gladly accepted and at the end of the summer term I left Wye with very mixed feelings; deep regret at parting with my many friends at the school, in the village and at the college, but intense satisfaction that the way to further achievement of my purpose was now opening up.

Transfer to Rothamsted 1907

First Visits to Canada and the United States

HALL and I had paid our first visit to Rothamsted at the end of April 1901. He wanted some samples of the soil of Barnfield (the mangold field) and Sir Henry Gilbert kindly invited us over to take them. So we went. It was a strenuous day. We rose at 4.30 a.m., were driven in Ben Coulter's trap to catch the London train from Ashford, and got to the Rothamsted laboratory soon after ten—hot, tired, hungry and thirsty, having had neither food nor drink since 5 a.m. Edwin Grey took us straight up to Barnfield. There we spent a hot, dusty, very tiring morning taking samples, but our tool was very ineffective and we should have fared badly but for Grey who was quietly drawing samples with his better implement. Then came the welcome news that Sir Henry expected us to lunch at his house at 1 p.m. We 'downed tools', returned to the laboratory to wash and rest, and presented ourselves at Sir Henry's house.

Sir Henry received us most kindly and courteously. He was nearly eighty-four, rather bent and walked with a stick but mentally alert; he had a long white beard and his right eye having been lost in his youth was covered with a shade. We did not see Lady Gilbert. Sir Henry would not lunch with us: his hour had always been 3 p.m. and he would not change this for us. Nor would he sit down. Instead he stood up and talked. He took little interest in Hall's investigations, but talked about my old chief, H. B. Dixon, whom he had met in Canada at the British Association meeting in 1897 and whom he liked very much. We failed, however, to draw him on any question of agricultural science and gave up the attempt; instead we got him to talk of some of the great pioneers, the first Dr Voelcker and others.

Lunch over we returned to the laboratory to find a message from Grey saying that he would take the samples and we could

remain in the laboratory or see the fields. We did both, but had to leave soon after four, getting back to Wye just before 1 a.m. Neither Hall nor I thought we should ever be associated with Rothamsted.

After Sir Henry's death in December 1901 Hall was appointed Director and went in February 1902.

The whole Institution was practically moribund. The laboratories had been erected in 1852 and consisted of a big barn-like structure and a few small rooms, one of which was used by Dr Miller as a laboratory. The main laboratory had long been only a store room; it was littered up with samples and thick dust: 'When I saw its mellow dustiness,' wrote Hall afterwards, 'my heart sank within me.' Gilbert had lacked completely the capacity to attract young men or to work with other people, Lawes only excepted. Lawes had tried to bring Warrington into the group but failed; the story of Gilbert's quarrel with Warrington makes very sad reading. His assistant, N. H. J. Miller, was one of the shyest and most nervous men I ever met; he confided in me that his life at Rothamsted had been very dreary. He was set a most deadening task: daily determination of ammonia in the rain and of nitrates in certain drainage waters; and any attempt to break new ground, or any suggestion in regard to the work, was promptly repressed by Gilbert and treated as an insult.

So Hall found not only a dusty but an empty laboratory so far as scientific colleagues were concerned. But if Gilbert had failed to attract young scientists he had trained up a group of village boys to do certain operations and thus had laid the foundations of the 'Assistant staff' who afterwards contributed so much to the success of the work.

Hall with his boundless energy soon got the place tidied up. He was firmly convinced that agricultural science, hitherto a poor relation of chemistry, must be made independent and put on a broader basis. He had no funds for more staff but proceeded to collect them, and after four years succeeded. In 1906 he appointed Winifred Brenchley as botanist; she was the first woman ever to work at Rothamsted and one of the first to hold any scientific appointment in agriculture. It being assumed that a woman could not live without tea Hall's wife provided daily at

4 o'clock a pot of tea and a tin of Bath Oliver biscuits: thus starting a custom which has proved most fruitful. H. B. Hutchinson was appointed bacteriologist early in 1907 and I came on in July.

Harpenden was of course a great change from Wye. The older inhabitants could remember when it was an isolated village, but the coming of the railway and its nearness to London (25 miles) caused it to develop rapidly as the favoured residence of prosperous London business men. The good sense of the inhabitants and the extensive Common prevented it from degenerating into a suburb.

In the autumn my mother came to stay with us: she was making a round of visits to her children to see what their homes were like. We could see that the end was near: her old lung trouble returned, my brother Quen had to come from Glasgow to take her home, and in a few weeks she was dead. All but one of her children assembled for her funeral: it was years since we had met, but we all felt the sense of completeness in her life. She had set out to make a good home and to bring up her seven children well, and she had done it. It was a cold rainy February day when we buried her, but as the coffin was lowered into the grave the sun broke through the clouds and for a few moments we were bathed in sunlight.

My laboratory was cramped and ill-ventilated—by 6 p.m. I had either a bad or an incipient headache. On the other hand Hall's new buildings, the pot culture house, Hutchinson's laboratory, and the unfinished new wings, were all good.

Hutchinson and I tried to solve the mystery of partial sterilization which I brought from Wye. He found that the increased biological activity I had observed was due to an increase in bacterial numbers (this we learned later had already been discovered in Germany): the reactive efficiency however had diminished, and our investigations led us to the view that normal soils contained some biological factor keeping down the numbers of bacteria but put out of action by partial sterilization. Hutchinson found ciliates, amoebae and monads in the soil that satisfied these conditions, and we attached importance to the ciliates as they appeared so abundantly in our cultures. Considerable controversy arose; it was generally supposed that the active soil

population consisted only of a few million bacteria or even less per gram of soil, with a few fungi, any other organisms being accidental and in an inactive form only. Tom Goodey showed that this was true of our ciliates. But C. H. Martin and K. R. Lewin proved that the amoebae were active and could function as we had supposed. The 1914 war caused the work to be suspended but it was resumed later.

Alongside of this work Hall and I completed the Survey of the Soils and Agriculture of Kent, Surrey and Sussex on which we had both worked at Wye; this involved me in much travel on foot, on bicycle or dog cart over the three counties (no car being available to me), and many visits to farms which I greatly enjoyed. Hall wrote it up and it was published by the Board of Agriculture; they jibbed at the inclusion of a verse from Kipling and some twenty lines from Mrs Marriot Watson's poem on the Downs, that kind of thing not being done in official publications; but Hall insisted.

During the summer of 1909 I went to Canada as Recorder of the Agricultural Subsection (as it then was) of the British Association. The subvention was £37 10s. but by travelling on slow boats and as the result of the overflowing hospitality of our Canadian hosts this came within £5 of seeing me through the long journey across to Vancouver Island and up to Edmonton. So I was able to meet some of the leaders of Canadian agricultural science. The senior was William Saunders, the Government Agricultural adviser; very friendly and always accessible, he had a remarkable knowledge of the country and was full of optimism for its future. He had already recognized the possibilities of the Peace River region and offered to take me there if I could stay, but I could not: much of the journey then had to be by canoe. He fully accepted the current estimate of 360 million acres as the potential area of Canada's cultivable land, which would still find defenders though barely half that area is as yet in cultivation. He had already bred Marquis wheat, but without fully recognizing its merits; that satisfaction was left to his son Charles, who using a rapid but inelegant chewing test on the grain, picked it out from a group of hybrids in the experimental garden at Ottawa as being of exceptional quality because the chewed mass stuck to

his teeth. Frank Shutt, the chemist, kindly and hospitable, organist at his local church in his spare time, had shown that after only twenty-two years of cultivation the rich prairie soil of Indian Head, Saskatchewan, had lost nearly one third of its nitrogen, and was urging the need for more conservative methods of management. Robert Harcourt (always 'Bob') was training a number of young agricultural experts at Guelph. Altogether a good start had been made with the building up of what is now one of the most distinguished agricultural scientific services in the world.

Among my hosts was Professor J. Mavor, the well-known Economist of Toronto University: scrupulously honest and bluntly outspoken when enthusiastic immigration officers and agents, anxious to attract more newcomers, made statements which he considered unjustified.

I met some of the pioneer farmers who had opened up the prairies, living in sod shacks till they could build themselves wooden houses, and I marvelled at the courage and endurance they must have shown. The buggy was still the common mode of conveyance: every little prairie town had its Livery Stables where a buggy could be hired: it might travel twenty or even thirty miles a day, and the journey to the railway station might take two days. Small horse implements were still common on the farms, and at harvest time it was necessary to bring over ship loads of men from Great Britain, Ireland and Western Europe to get the grain in before the frost appeared. The Prairie Provinces may well be proud of their founders. In going round it was clear that soil erosion had begun but was not yet serious; it was not included in the programme for the day's discussion of wheat problems.¹ I was enormously impressed by the courageous display of optimism and the infectious air of strenuous effort manifest everywhere and I was delighted to meet quite by accident one of my Wye students who had seemed incurably idle but in this bracing atmosphere had buckled to and in association with another Wye student was opening up a part of the Okanagan valley for fruit growing greatly to the advantage of himself and the community.

¹ This had been an important part of the British Association's proceedings at Winnipeg.

This Canadian visit made me realize that I had been leading too isolated a life cut off from scientific intercourse apart from our small group at Rothamsted, and I decided I must take more part in the activities of some of the scientific societies. Also I realized that a vigorously growing country like Canada presented entrancing problems that Rothamsted ought to tackle, and I resolved to make similar journeys whenever the opportunity arose.

The year 1910 is a turning point in the history of agricultural research in this country. Until then the Board of Agriculture had not interested itself in research in agricultural science. It gave occasional small grants for the study of specific practical problems, but each was considered an end in itself. Hall had been to the President to plead Rothamsted's need for money, but he was coldly and curtly told that if he wanted money he must collect it himself; he would certainly get none from the Board. The President could not conceive the circumstances in which the Board would concern itself with scientific research. Later and unofficially the Secretary told Hall that British agriculture was dead, and the Board's business was to bury it decently.

But in 1910 all this was changed. Mr Lloyd George decided that British Agriculture should be revived and he set up a Development Fund of £1,000,000 for this purpose. The Fund was to be invested and the income administered by Commissioners, who had a very considerable measure of independence. They were empowered to encourage scientific research and could themselves initiate scientific investigations.

It was the first time that a British Government had made itself responsible for scientific work in agriculture. The precedent, once established, was followed up, and in due course large grants became available.

Hall was appointed one of the Commissioners and Rothamsted received a substantial grant. The work, however, took more and more of his time, and finally he had to decide which to give up: the Commissionership or the Directorship. At first he decided to give up the Commission, but his colleagues would not hear of this: his sound knowledge, critical judgment and constructive imagination had made him indispensable. So they got

permission to offer him a permanent paid post. This he accepted and in the autumn of 1912 he left us, greatly to our regret, for we all recognized that no successor could possess his brilliance and distinction.

I was appointed Director. The news reached me in June just as I was starting for my second journey to North America, this time to the United States. Periodically their Department of Agriculture arranged a summer school for their experts and they invited me to go over and give a course of lectures. Hall and the committee readily agreed.

I arrived in New York in the midst of a severe heat wave: the newspaper placards announced ten more deaths. I telegraphed to my old friend Dr Wheeler of the Rhode Island Experiment Station asking if I might come out there to be cool. Soon a pressing invitation came with instructions as to route and time of train. He met me in his buggy and we had a long and delightful drive in the cool of the late evening through attractive New England country—woods and fields and open land with stretches of sea and a sprinkling of old 'Colonial' houses, while fireflies danced round us in profusion. I spent a very pleasant two days under his guidance, and saw his experiments, which had made the Station famous, on the acidifying effect of sulphate of ammonia on the soil.

The course was held at Lansing, Michigan, and lasted a week. It was under the direction of Dr A. C. True of the Department: one of the kindest and most courteous officials I have ever met in any country, and full of knowledge about the work of the Department and the men. Lectures and discussions kept me busy each day till 10 p.m. But an American expert audience is always stimulating and I thoroughly enjoyed the week.

I went on to Lincoln, Nebraska, where I was being shown the deep loess soils by Professor F. J. Alway, an attractive young Canadian who had come to seek his fortune in the States. Lincoln was unbearably hot and noisy and so I stayed with Alway at his house in the quiet country: at night we slept soundly on the veranda, soothed by the chirping of the 'grasshoppers', and by day we lived in shirts and trousers. Here I saw something of the difficulties of running a home in the Western States. Little help was to be had and that little rarely went the way of Professors.

Mrs Alway and her daughters happened to be away, and he had to get up at 4 a.m. to do the housework and prepare the breakfast before going to the University. This was not unusual—even the Chancellor had to leave his office about mid-day to stoke the furnace at home whenever it was wanted.

I lectured to the students and deliberately broke away from the purely practical aspects which, I could see, figured prominently in the college teaching. Instead I laid stress on the infinite wonder even of a common clod of earth, emphasizing the fact that true scientific work is concerned not with squeezing out a little more produce but with studying Nature for its own sake:

To read what is yet unread
In the manuscripts of God.

The lectures were well received, and, in turn, I was greatly impressed by the students; some of the women students especially were very attractive; in those days they still wore their own complexions. Some of them had to earn their keep and fees, and they did this by going out as 'lady helps' during part of the day. Single professors and lecturers living in their own rooms or houses could at times sample the home-making capacity of their students, and not infrequently a new home resulted. Most of the men students also worked, especially during the vacations.

Alway took me round the State a good deal and we visited some of the students' homes where we were most hospitably received. They were farmhouses, often remote, most of them unattractive with no attempt at adornment, no garden and few trees: it puzzled me how such very nice young people could come out of such unpromising surroundings.

One visit I would on no account have missed. Alway took me to see a good example of alkali soils in one of the valleys. This particular section belonged to a very rich man; the train passed through his land but the station was some miles away. Alway asked the conductor if the train could be stopped to let us get out and so save the long journey from the station, but he said no, that would be illegal. But, he added with a twinkle, 'If Mr X knows you are coming, the signal near his house may be against us, and then we shall have to stop. So you may as well be ready to hop out.' We were, and sure enough the train did stop, and

we went straight to the house to report our presence. We were asked to be back for lunch and went off to see the alkali soils. On our return we expected to see our host and hostess; instead we were taken to eat our meal in the kitchen with the harvest workers; in so rich a man's house a couple of professors so far down the dollar scale had no dining-room status. Alway was greatly distressed; for him the experience was not unique though it was rare, but he was grieved that I should have had it. On the other hand I was delighted; a glance round the table showed me that the company was excellent, cheerful and full of life and gaiety, while the cook, a good Scandinavian woman, assured us we should get a better meal than if we had been in the dining-room.

From Lincoln I went to Elgin to stay with George Coupland, a remarkable man deeply interested in science. He had come out to Elgin in the early days with the first settlers when 'prairie schooners' (covered wagons) were still going across to the west; and in winter it had been necessary to plough a furrow from one farm to another, and from the farm to the church, so that people could find their way after dark. He had been through the financial crisis of 1893—when western people had lost faith in paper money and would take only silver dollars. So prices collapsed: he sold pigs in Chicago at 3 cents per lb. and maize at correspondingly low prices. But things had steadily improved; land had risen in value and incidentally brought much money to some men who had no idea how to use it. We passed two of them lying on the pavement outside a saloon with their coats off, and far too much liquor inside them. Others, also very well off, were sitting inside smoking cigars or chewing toothpicks—a favourite occupation in these western towns.

Then I went on to Illinois where Cyril Hopkins, then Professor of Agriculture, took me round part of the State. He was equally popular with farmers and students: he knew the country intimately and was able to give them very sound advice, although its scientific basis, a strictly arithmetical comparison of the number of pounds of nutritive elements in the soil with what is required by a full crop, was faulty. Drainage, phosphates and a suitable rotation were his main recommendations.

At the Cornell Agricultural College, Ithaca, New York, I met Lyttleton Lyon, Warren, and other distinguished agriculturists,

and saw a good deal of the surrounding, wasted country: the early pioneers had cut down trees heedlessly and so caused much soil erosion; bad agricultural systems had greatly deteriorated the land, and many farmsteads were in low condition. But the College staff in addition to their outstanding scientific investigations were showing how these troubles could be rectified.

CHAPTER IX

Rothamsted and the First World War

I took over the Directorship of Rothamsted in October 1912. We were as yet a small group of workers, but the possibility of grants from the Development Commission opened out new prospects. I was able to invite B. A. Keen of University College, London, to join us and start those physical studies of the soil for which he became widely known, also K. R. Lewin the proto-zoologist and a small group of good post-graduate workers. But I knew from sad experience that we could not get very far in our old laboratories. So I put before my Committee a plan for a new block to cost £12,000, a large sum for those days, but half would come from the Development Commission if I could raise the other half. I said I would try: the Committee gave me its blessing and left me with a perfectly free hand.

I succeeded and the laboratories were duly built. Also I wanted a good library; not simply a collection of modern technical publications but one including the works of the old writers from the fifteenth century onwards: books which could then at times be acquired but would I knew soon be out of our reach. I wanted them preserved in an appropriate setting, and being completely weary of the utter unattractiveness of the old building, I instructed the architect to do his best with the hall, staircase and library, which he did. To deal further with the fatigue problem some attractive little gardens were made, past or through which people had to go in walking from one building to another. Unfortunately the war of 1939 prevented my putting the finishing touch and laying out the front; this came later.

I was most anxious that Rothamsted should get into close touch with progressive farmers and landowners, and I found them very responsive. I have the pleasantest recollection of many visits, usually involving a stay of one or two nights or over the

week-end. Frequently the day began with prayers and a reading from the Bible, for which purpose the whole household assembled in the dining-room. Then followed a country breakfast to prepare one for a strenuous day. Afterwards the mistress attended to her household and garden duties and the master made his rounds. Dogs, horses, farm animals about the buildings, were all inspected; the bailiff, the stockman, pigman and other Heads were seen and their reports were discussed with them. Then there was a tour of the farm and, if one were at the squire's house, of the village. If anything was wrong it must be put right: there was no officiousness, but efficiency and kindness. Many of the squires served on public bodies and on the Bench, and they accepted as a basic principle—and the villagers heartily concurred—that the estate and the village must continue; that the present owners were custodians and trustees whose duty it was to pass on to their successors without loss, and improved if possible, the things they had received from their predecessors. Above all the productiveness of the soil must be conserved. I was always invited to suggest improvements and accordingly took full notes and soil samples and would afterwards send in a considered report.

I had come too late into the country to become a complete countryman. I loved cricket, and later learned to play a little tennis very indifferently, but I could not ride nor could I even pretend to any views on horses, hunting, fishing or shooting; my student days had been so occupied with the problem of survival that I never learned to play billiards or cards or to discourse pleasantly and at length about nothing in particular. Nor could I dance. I had taken a few lessons during my prosperous years at Manchester but I was never good at it and anyway new dances had come in which I could never acquire. I did not smoke, never took beer or spirits and only gradually came to enjoy a good glass of wine; I never developed views on vintages. But I was greatly interested in my hosts and hostesses and their people, and thoroughly enjoyed seeing their treasures—delightful possessions some of them were—and hearing about their plans, their hopes and their fears: when I left there was almost always the invitation, obviously sincere, to come again.

These country houses were centres of social activity in the

village and they made English country life something unique in the world. Nowhere else is there anything like them; one of the great tragedies of our time has been the crushing of these good houses out of existence by high death duties and crippling taxation.

Not all squires came up to these high standards: some lacked the necessary moral qualities, and some had been so badly impoverished during the depressions of the 1890's that they lacked the necessary financial resources. The younger ones were breaking away from the custom of family prayers but the best of them were as keen as their fathers on the improvement of the village and of the local agriculture. Unfortunately many of these were killed in the 1914 war.

Meanwhile an important practical application of the work on partial sterilization of soil kept me busy. There had for many years been an important glasshouse production of tomatoes, cucumbers and other crops in the Lea Valley and trouble had arisen from 'soil sickness'. The usual treatment was to throw out the soil and bring in fresh; this was easy in the early days, but became more difficult as the industry expanded. One of the growers, the very enterprising W. B. Randall, heard of our experiments, and thought that partial sterilization might provide a cure for 'soil sickness'. He came over to Rothamsted accompanied by two or three growers: they saw our results and we discussed the problem in full. The growers agreed to carry out experiments in their own houses, and I agreed to go over once a month to watch their progress. The results were so successful that we were asked to establish at Rothamsted a special branch for the study of glasshouse problems. I raised the matter with the Committee and they advised a consultation with the solicitor who had drawn up the Trust Deed. He was now old, but he and his younger partner gave me an interview. His advice was very definite: 'Do not expand,' he said, 'keep strictly within the four corners of the Trust Deed. You have got an absolutely safe position from which no one can dislodge you: don't lose it. If you expand you may be in for endless trouble.' But I was bent on expansion and quite prepared to risk the safety of my position; I remembered, too, what Alfred Mond had told me: 'There is only one comfortable place in the procession through

life, and that is at the top'. It was, however, deemed wisest that the glasshouse research work should be done in a separate Institution and I was strongly of opinion that this should be located in the heart of the industry so as to maintain close touch with the growers. They were a fine body of men: some of the best were Danes and chief among them was H. O. Larsen, one of the most gifted growers I ever knew and one of the most likable of men. The industry owes a great deal to him. He and I interviewed the County Council officials and secured grants, other funds were collected and the new Station started work at Cheshunt in October 1914, its laboratories took a year longer to complete. Its first Director was soon replaced by one of our Rothamsted young men, G. H. Bewley, under whom the Station has been very successful: so much, indeed, that I always hoped similar stations would be set up for some of the other specialized crops, such as sugar beet and potatoes, but this has not yet come about.

At home ours was a peaceful and happy life that we could have continued indefinitely. Our six little children loved the garden; they knew all the trees and named all the climbable ones; they knew the lairs and dens out of which bears and tigers might pounce upon you; and under a good governess they were making steady progress. We decided to send all our boys to Oundle and our elder daughter to St George's, Harpenden, later we chose Sherborne for Clare. Walter, the eldest, had already at six years of age declared his intention of staying with me and going with me a long way away; Nellie's birthday had fallen on the Coronation Day of King George V, and the children were convinced in spite of all we said that the village celebrations and illuminations were for her and not for the King; as a Christmas present, John, aged six but already the student, asked for Pope's translation of the *Iliad* and learned to declaim passages from it as he lay in bed. A little later when Francis, sunniest and brightest of them all, was sent to school he was asked how many children we had: 'Six' he replied with his slight lisp, 'and I am thankful to say we are not expecting a seventh'—but a seventh came all the same. On another occasion, when my birthday cake appeared with only five candles—a palpable falsification—and direct questions led only to evasive answers, the matter was

dropped, and I thought ended till one afternoon the troop marched gaily in bright-eyed and eager, shouting: 'Daddy, we know now: you are forty-one! We^e went to the library at St Albans and looked in *Who's Who*!' Such were the events and excitements of those peaceful days.

Then on August 4th, 1914, came the shattering blow: the outbreak of the First Great War.

Within a short time all the best of my young men had volunteered and gone; for most unfortunately we started on the voluntary system which meant that only the best men went, and their losses were terrible. As they went their places were taken by women straight from the University, but each one understood that her post was 'for the duration' only, and that she would vacate it when the men came back. They did magnificent work, and thanks to them Rothamsted ~~was~~ able to deal with all the problems referred to us.

Experts feared widespread unemployment and my first war work was to examine schemes of land reclamation with a view to the employment of labour: this proved unnecessary. Other expectations were unfulfilled, and things went from bad to worse till finally in December 1916 Mr Lloyd George was put in charge. He saw the need for more and more munitions, and he had the drive and energy to get them. I became a member of the Munitions Inventions Panel and also of the Nitrogen Committee dealing with supplies of nitrate and ammonia, both of which were required for high explosives and for fertilizers. Also, under Lord Moulton, I had to work with Colin Frye at the Ministry of Munitions on sulphuric acid which was badly needed for both munitions and the fertilizer industry; my task was to search for economies in fertilizer manufacture. Also I had to try to find substitutes for the potassic fertilizers, which in peace time had practically all come from Germany; here only moderate success was achieved; blast furnace flue dust contained some potash but also cyanides poisonous to plant growth.

The depredations of German submarines made our food situation very serious and a Food Production Department was set up in December 1916 with T. H. Middleton as its Technical Head. From the outset he wisely adopted the policy of ploughing up grassland and growing corn and potatoes. This was unpopu-

lar among agriculturists, but Middleton remained firm. While still continuing with Lord Moulton I joined him as Technical Adviser and had to draw up practicable schemes of manuring: to help matters I wrote a short book *Manuring for Higher Crop Production*.

Various practical problems were studied at Rothamsted. Among them was the more economical making, storage and use of farmyard manure. Thanks to the generosity of the Hon. Rupert Guinness, afterwards the Earl of Iveagh, we secured the services of E. H. Richards for this work, and he and H. B. Hutchinson discovered the factors necessary for the rotting of straw and other vegetable refuse and so for the first time put compost making on a proper scientific basis. Their method is now widely used in many parts of the world. We soon came up against wireworm trouble which, however, we failed to overcome. I wholeheartedly supported the ploughing up programme. I deeply loved to see the ploughman at work, the growing crops, the ripening corn and the harvesters getting in the produce, and I had always regretted the laying down of land to grass. All the same I recognized the importance of grass on the farms and the fact that the ploughing up of the grass land would diminish the supply of organic matter in the soil, and I urged that, on heavy land, where grass was a necessity, 'the way out seems to be the North country system of alternate grass and tillage. . . . A few demonstrations on these lines in heavy land districts would resolve many of the farmers' doubts as to the advisability of breaking up some of their grass land'.¹ Some grass land would always remain, however, and this I urged should be improved.

At the Food Production Department part of my job was to visit districts where there was trouble between the farmers and the County War Committees, and try to find the way of peace. Sometimes the farmers were ~~in the~~ wrong and I had to explain to them the seriousness of the situation—on one occasion five grain ships in succession were torpedoed leaving us with only about three weeks' supply in the country. Sometimes the Committees were in the wrong and set the farmers an utterly impossible task. The farmers in a high moorland district had been

¹ British Association Reports (Newcastle Meeting) 1916.

ordered to plough up their grass and sow wheat. They pleaded that the rainfall was too high and wheat cultivation was quite impossible, but the Committee was adamant. I went down and stayed at a very comfortable little hotel: the Committee wanted the inquiry to be held there. But I insisted that it must be held on the ground itself. This pleased the farmers and I soon saw why. The sky was becoming ominously overcast; the farmers were clad in raincoats and Wellingtons and mounted on shaggy ponies; the Committee were in decent black suited to their station. We went up to the moor and when we got to the land in question the rain began pitilessly beating upon us. It was not long before the Committee accepted my proposed compromise: that the region being undeniably wet the order remain in abeyance till such time as the Committee could provide the farmers with varieties of wheat suitable to the conditions and could demonstrate methods by which it could be grown.

On another occasion a group of good dairy farmers, producing large quantities of milk on their grass and mangold land, were ordered to plough up and grow wheat. I found that the contribution to the wheat supply would be small, that the loss of milk would be considerable and I got the Committee to agree that for purposes of the order mangolds could be taken as wheat.

In all these inquiries I did my best to save the face of the Committee when I had to give an adverse decision: they were honestly trying to do their best, often in very difficult circumstances.

Rothamsted escaped war damage, except for a bomb dropped by a Zeppelin on Broadbalk near the bailiff's cottage. I asked him in the morning whether his family had suffered at all. He said he reckoned they were sixpence up. 'How do you make that out?' I asked. 'Well, you pay for the windows. We lost a jug that had cost us 1s. But our chimneys had wanted sweeping and the explosion shook down all the soot, we saved the 1s. 6d. we should have had to pay the sweep. We lost 1s. and saved 1s. 6d.'

And that was all the damage to morale that that particular bomb did.

At home we got through in spite of all difficulties. Our household staff before the war had been five persons—staffs were big

in those days because workmen were plentiful and wages low¹: we had a cook, a housemaid, a governess, a nurse and a gardener. But during the war we were reduced to a part-time jobbing gardener. The milk supply for our six children was our most serious problem, but Elnor got round that by setting up two goats. One soon died, but the other, Joan, faithfully discharged her duties and we became very fond of her. After the war she had to go because, to our great regret, she developed the incurable habit of eating the bark of our choicest shrubs.

After the war I was appointed a member of the National Salvage Council charged with the duty of utilizing or disposing of the colossal quantities of explosives that Mr Lloyd George's boundless energy had conjured out of our factories. So for some months after the Armistice I was engaged on a wide range of disposal problems and dealing with things as varied as sewage sludge, cordite, and TNT. B. Martin Lowry and I studied the possibility of changing the two latter into fertilizers. Workable solutions were found for some of the problems, though I am not going to pretend that they were ideal.

In addition I was able to help the Belgian Government with some problems in the Belgian Congo, for which the King of the Belgians gave me the Order of the Crown of Belgium. Our Government also gave me in 1918 the Order of the British Empire, but the honour that I prized most of all was my election in 1917 as Fellow of the Royal Society.

On June 17th, 1920, my father died suddenly in his seventieth year from heart failure. He was at his work in the morning; after lunch he felt unwell and went to lie down, within half an hour he was dead. It was the ending he would have wished. He had been minister at Ross Street, Glasgow, from 1897 to 1908 and then became Missionary Minister for Scotland which necessitated his removal to Edinburgh. His end was probably hastened by an accident in 1919 when he had been knocked down by a motor cyclist and broke his leg. He had remarkable energy and power of work, and with systematic training he could have gone a long way but he would not necessarily have had a more useful life.

¹ We usually paid about £12-£16 a year for a young maid: the governess had £25. The gardener lived out, and had £1 a week.

Of his twelve children—nine by his first and three by his second marriage—ten survived him; seven sons and three daughters. Among his father's children he had been the only student. Of his own children five inherited his preference for the student's life; Arthur had a successful scholastic career, Laura began as a teacher but married a head master, and Leonard as is well known became a Professor of Philosophy and Fellow of the British Academy. Ernest took to ship building; became first designer then General Manager to Denny's of Dumbarton, and Quen. was in business on his own account. One of the sons of the second marriage became a coffee grower in India and the other a civil engineer.

CHAPTER X

Expansion at Rothamsted *The 1920's*

ROTHAMSTED had done so well during the war that expansion naturally followed when it was over. The men returned, but not Lewin or Martin, who to our great sorrow were killed. Some of the women, notably Mary Glynne, Lettice Crump, and Ruth Gimingham, had done so well that it would have been absurd to let them go even though 'the duration' was ended: they had moreover shown the great advantage of a mixed staff. The Development Commission asked us to expand our organization so as to include Plant Pathology and Entomology. W. B. Brierley was transferred from Kew, and A. D. Imms from Manchester to take charge. Hutchinson left us for the Distillers' Company but H. G. Thornton of New College, Oxford, took his place. H. J. Page came on as Chemist, and F. Tattersfield and E. M. Crowther, who as members of the Society of Friends had joined us during the war and done excellent work, stayed on.

There was more difficulty about a new subject I was anxious to introduce. One of the first things I had done when I became Director was to look into the cupboards, where I found great masses of data from the field experiments. The figures were good, all honestly and carefully taken and recorded. But they had never been worked up and I knew that I was incompetent to undertake the task. I also knew, however, that the Census authorities dealt with even greater masses of data and succeeded in extracting good information from them. So I applied both to Oxford and to Cambridge for a young mathematician having knowledge of their methods and willing to see what could be got out of our records, but neither was able to help. As often in those days, Horace Brown, the kindly and distinguished brewing chemist, ever helpful, came to the rescue and introduced to me a young mathematical schoolmaster who wanted to change his

profession and was greatly interested in the new statistical science, then the Cinderella of mathematics. He came to Rothamsted in 1918, examined the data, saw that much more information was contained therein than had yet been extracted, and expressed his willingness to undertake the investigation. I was very greatly impressed with him—it was R. A. Fisher, now the very distinguished Balfour Professor of Genetics at Cambridge—and we appointed him to set up a Statistical Department.

I knew perfectly well that he could not confine himself exclusively to the study of our data. Directly anyone begins to develop a new science he is bound to get on to new paths, the end of which no one can foresee. I was not going to limit his investigations, because I was certain that, whether they were concerned with our data or not, the science he was building up would be of the greatest help to us later on. But High Authority did not take this view, and I got a personal letter urging me to change the programme. This I was not prepared to do: fortunately the matter dropped without reaching the official stage. Events proved the wisdom of leaving Fisher alone; he developed methods that were both elegant and efficient for examining the data given by agricultural experiments; they were broad enough to take in the whole range of biological science. He fundamentally altered the design of field experiments, improving them out of all recognition, and it was with great pride that I heard Sir Harold Jefferys, the distinguished physicist, declare many years later that, thanks to this work, 'the standard of presentation of results in agriculture is better than in any of the so-called exact sciences . . . a state of affairs that physicists should cease to tolerate'. Fisher was in due course appointed to succeed Karl Pearson at University College, London, and then to the Arthur Balfour Chair of Genetics. His brilliant successor, F. Yates, has been able still further to develop the subject.

The next problem was to ensure a succession of juniors of a quality to match that of the senior staff. Not being a college we had no supply of students on which to draw, and I used to visit the chief University Departments, giving lectures or addresses describing our work and our aims, hoping to secure recruits. I told them I could not promise much money, but the

work was of absorbing interest and of vital importance to the community. I arranged also with the University of London that Rothamsted should be a Research School of the University, where students could work for the Ph.D. and D.Sc. degrees. We could of course take only few and could retain still fewer, but we were extremely fortunate in those who stayed with us. From 1919 onwards to the end of my time the total number was not great, yet eleven of them became Fellows of the Royal Society, one a medallist; seven were in the Honours' Lists, two of them knighted, a number were appointed to University Chairs or became Heads of Research organizations. And they were as loyal as they were brilliant: nowhere could there have been a better staff.

Of course this expansion meant a radical reorganization of the institution. The old method in which the total staff of half a dozen could settle affairs at a time was no longer suitable and we set up a Staff Council consisting of all Heads of Departments and elected representatives of juniors and of Assistant Staff: it managed the internal affairs of the Institution. Also, as agricultural science did not fit tidily into any of the pure sciences but branched on several of them, it was imperative to ensure active co-operation between the various Departments, and to this end each must know what the other was doing; colloquium meetings were therefore held monthly at each of which the work of one Department was described and discussed. For the same purpose every junior had to qualify as Guide to take an intelligent visitor (of whom we had many) over the whole Institution and give a reasonably good account of the work. In order to ensure harmonious intercourse between Departments, Social Unions were set up, one for the Scientific Staff and one for the Assistant Staff, but these were afterwards merged; what was perhaps more important, my wife arranged small intimate tea parties at our house on Sunday afternoons and larger At Homes once a month when much histrionic talent would be discovered for the performance of charades and the like. We were a very happy family and very industrious: the scientific journals bear testimony to the volume and quality of the work.

These various methods kept our scientific work coherent. The aim was to study the nutrition and growth of the plant in health

and disease, to study the soil as a habitat for plants and the numerous organisms living therein, and to study this soil population in such detail as we could. My part was to build up such of the results as were relevant into a systematic subject in my book *Soil Conditions and Plant Growth*, which went through its editions as quickly as I was able to revise it¹; other members of the staff were encouraged to do the same for their subjects.

Alongside of this scientific work, however, I wanted a more technological programme dealing with some of the more important practical problems of the day, for I was most anxious that Rothamsted should keep close touch with the best of the farmers and landowners. One group of problems was straightforward. Various sections of the fertilizer industry wanted information about the relative values of fertilizer compounds, and this necessitated field experiments in different parts of the country. The Institute of Brewing wanted farm and laboratory experiments on malting barley, and appointed me Chairman of their Barley Committee, a position of which I was very proud as it enabled me to meet some remarkable men whose profound knowledge of malting amazed me. There was E. S. Beavan who possessed uncanny power of predicting the behaviour on malting of a sample of barley simply by looking at it and fracturing some of the grains: he was generous, impulsive, forthright, a militant individualist vigorously denouncing officials and Government-fed agencies; H. D. Cherry Downes, equally keen on barley and on hunting; H. M. Lancaster, R. V. Reid, Owen Wightman, great experts in their subjects, men of character and wide interests whom it was a pleasure to know. To supervise these experiments I bought a little open car which Elnor and I learned to drive, and in that glorious summer of 1921 and again in 1922 and 1923, made our round including centres scattered over the eastern part of England and South Scotland, and from Shropshire to Devon in the west: doing it in three spells of a fortnight each, and covering some fifty to eighty miles a day. There was

¹ Published by Longmans. The first edition appeared in 1912 and the seventh in 1937; there were also three reprintings. Translations were made into French, German, Russian, Polish and Hungarian, and a photographic reproduction (without asking permission) in China. In 1950 an eighth edition appeared, recast and rewritten by my son E. W. Russell: it has been translated into Spanish and Indonesian. The ninth edition is now being prepared.

not much traffic on our roads and we could amble along peacefully at twenty-five miles an hour; neither road surfaces nor our valve springs or tyres were conducive to high speeds.

The experiments were nearly all on good farms: the visit was usually the occasion of a little friendly gathering at lunch or tea arranged by a hospitable farmer and we would discuss the experiments and many other things. I learned a great deal about English farming and gathered many notes intending to write a book about it, but I lacked the necessary intimate knowledge of livestock (though not the interest) and so the book was never written. I saw much of the sturdy resilience of the British farmer and of his surprising toughness. In a Wiltshire village the doctor, whose round had to be very wide to provide a living, told me of a farmer who called him in to repair a cut hand, and who in reply to inquiries about his mode of life said that he drank half a bottle of whisky and two quarts of beer daily. 'If you go on like that you will be in your grave in six months,' the doctor warned him, but the reply was: 'You be the fourth doctor what's told me that, and I've been to the funerals of the other three.'

I should like to have had a wider programme of investigations to help farmers in the very difficult plight in which they found themselves in the economic crisis of the 1920's and 1930's. We had the research machine ready to act: a brilliant group of young scientists, good laboratories and many contacts with farmers. What practical use could we make of it? Unfortunately there was then no consistent agricultural policy, and no programme to which we could work. The Corn Production Act of 1921 would have encouraged arable farming which we could have helped greatly. But after a very short life it was repealed. Higher output was definitely not encouraged. I put before a high official a programme based on those lines but his answer was: 'It is no use you showing how to make two blades of grass grow where only one grew before, what we want is to make one blade of grass grow where there used to be two.' The trouble was widespread: Mrs Leese, the American agitator, was advising Kansas farmers 'to raise less corn and more hell'. As Deputy Chairman of our County Agricultural Wages Board I was only too fully aware of the grave financial difficulties of both farmers and workers, but I wasn't going to adopt Mrs Leese's slogan.

Instead we based our programme on lowering costs of production by increasing the efficiency of the farming operations and of the workers, and by reducing wastes and losses of crops by diseases and pests. Cultivations, the most costly item in arable farming, were studied by B. A. Keen and E. W. Russell, while fertilizers, which held the key to higher yields per acre, were investigated by E. M. Crowther, H. V. Garner, T. Eden and others. Meanwhile J. R. Moffatt and others were testing appliances to effect economies about the farm: electrical devices including electric fences for which the General Electric Company gave much help; rubber tyred tractors and carts where our neighbour Sir George Beharrel of the Dunlop Company helped us greatly. Large numbers of farmers came to see these various things: the results were published in the Rothamsted Annual Reports.

Another application of electricity for which good results had been claimed proved ineffective. Lionel Lodge's experiments had suggested that a high tension electric discharge over growing crops increased the yield. The Electricity Commission was then beginning its operations and they asked Professor V. H. Blackman, Mr Howes and myself to carry out field tests: the results however were entirely negative.

It was not enough, however, to help farmers and landowners: I wanted also to do something for the village schools, where many of the farmers and most of the workers were educated. The deep interest aroused in me by my association with the Wye school has never died down. The lessons I had given there were published by the Cambridge University Press in 1911:¹ the book still lives, since the first edition it has been reissued six times and the last issue in 1950 is also the most attractive. As far as my work permitted I took part in refresher courses for rural school teachers during all my time at Rothamsted, and for a considerable period from 1924 onwards I broadcast lessons to village schools, not with the idea of turning the children into farm workers, but to help them read something of the wonderful book of Nature that lay open at their doors. I have known many instances of the profound and widespread influence on the village life of a good and sympathetic schoolmaster, and of the great educational value to the whole village of a well-managed school

¹ *Lessons in Soil.*

garden, and I deeply regret the curtailing of the village schools that is now taking place.

I wanted also to help the workers, and when the Agricultural Wages Boards were set up I gladly accepted the invitation of the Minister of Agriculture to serve on our County Board as a Nominated Member, a position I held till I left Rothamsted. Our Chairman was Sir Charles Doughty, Q.C., whose ability to apprehend a difficult problem and give a clear and well balanced decision was a revelation to me. The other nominated member was that grand old gentleman, Albert Mansbridge, who had rendered magnificent service by establishing the Workers' Educational Association and the Seafarers' Education Service and College of the Sea; organizations that I would gladly have helped had time permitted. Like me, he had started as a Leftist but became disgusted with the careerists who chose the Left because it seemed to offer them better prospects.

Meanwhile much valuable scientific work was being done at Rothamsted. H. G. Thornton was elucidating the relationships between the nodule organism and the leguminous plants; he also isolated the vigorous strain now widely used for inoculating lucerne seed before sowing: the distribution was put into the hands of Allen and Hanbury as we did not wish ourselves to embark on a commercial undertaking. F. Tattersfield was doing good pioneering work on typhrosia, pyrethrum and other vegetable insecticides; this later helped the pyrethrum growers of Kenya. W. B. Brierley was studying problems of species characterization in fungi, an essential preliminary to proper classification. Mary Glyne was doing valuable work on wart disease of potatoes, and Katharine Warington was studying the remarkable effects of a trace of boron on the growth of plants, so opening up a fascinating story the end of which no one can yet see.

We were particularly fortunate in our assistant laboratory staff and our field workers. One of them, Edwin Grey, a village boy with little schooling, combined a vivid memory of many years with the gift of terse expression: I asked him to write down his recollections. His two books, *Rothamsted Experimental Station, Reminiscences, Tales and Anecdotes, 1872-1922*, and *Life in a Hertfordshire Cottage*, were well received, the latter being favourably reviewed in *The Times Literary Supplement*. He remembered

a casual farm worker selling his wife because she no longer pleased him. On one occasion when our first tractor, obtained in the 1914-18 war, stopped work (a not uncommon habit) the little group of horsemen ploughing in the same field left their teams for a moment to scoff at the driver as he sought the cause of the stoppage. Presently he opened up the carburettor and found a small fly blocking the jet; blowing it on to the palm of his hand he said proudly: 'There, that's what done it', and immediately from one of the group came the line from St Paul: 'God hath chosen the weak things of the world to confound the things which are mighty.'

Fortunately I had the full support of the Committee of Management in all these activities. They were an ideal body for running an Experiment Station: few in number but each one was a leader in his branch of science or in agriculture. Lord Bledisloe, the Chairman from 1920 to 1924, had the triple qualification of combining a wide knowledge of agriculture and a deep appreciation of the possibilities of science with great popularity among farmers throughout the country. I had first known him as Charles Bathurst, a lone figure in the House of Commons persistently urging the need for greater attention to our agriculture—which in the end he secured. He was succeeded by Lord Clinton, a great agricultural administrator, who had an almost uncanny gift for finding a way through a tangled problem and effecting a compromise where at first agreement had seemed impossible. Difficult and trying problems sometimes arose and it was often due to the tactful genius of both Chairmen that a satisfactory solution was found. Then came Earl Radnor whom I had known since his youth and had first met at one of Owen Hugh Smith's delightful week-end parties at his country house at Langham, in Rutland; he doubled the part of city magnate and country gentleman and was equally distinguished in either rôle. Earl Radnor successfully saw the Station through the second war and the period of rapid development that followed.

Life was very full and my days were long: I was at the laboratory from 10 a.m. till 7.30 p.m. with breaks for lunch and tea; usually I had to go back after dinner in the evening and stay late or else to take work home. I kept close touch with the farm and tried to visit it each afternoon. At first Elnor and I were able to

take a day a month off, like our maids, and went up to London to see the sights, finishing at the Haymarket Theatre where one could be sure of a good comedy—the perfect ending for a happy day: our train got us home at 1 a.m. But as time went on these visits had to become more and more rare. In my very limited leisure my favourite authors were Boswell, Cobbett, Shelley, Mrs Gaskell, Jane Austen, Borrow and Charles Dickens—to these I have remained faithful all my life, adding later Agatha Christie. History, too, I always enjoyed; I also read a good deal of French, German and, later, Russian literature. But my reading (apart from my work) was of the desultory armchair type done by a rather tired man. However my life was extremely interesting.

Numbers of distinguished visitors came to see Rothamsted. Among others were Mr and Mrs Bernard Shaw, who lived not far away. At lunch (for which Elnor devised a vegetarian dish that he greatly enjoyed) he captivated us with his sparkling conversation and on going round the Laboratory intrigued us greatly with his brilliant and illuminating irrelevances. Of course one never knew whether one's legs were being pulled or not. After lunch at his house one day he was showing me round his beautiful garden and at one point we came to a place where we got a charming view which, however, lost something from a rather rough adjoining field. He had been declaiming against the immorality of the private ownership of land, and then, catching sight of this offending patch, burst out: 'Doesn't it spoil the view? I have offered the owner such a good price but would you believe it, the fellow won't sell!'

Mr Ramsay MacDonald came first when he was Lord President, when I got the Russian Ambassador, Mr Maisky, and his wife (of whom I saw a good deal while they were in England) to meet him: they were the days of cordial relationship. Later when Mr MacDonald became Prime Minister he invited Elnor and myself to lunch with him and his family at Chequers; we were a very happy party. After lunch he took us round the house and showed us its treasures; he had a remarkable knowledge of them and knew the galleries where the companion pictures could be found. Perhaps my most abiding recollection of him was my last visit to Chequers; it was during an anxious period and he

was tired, his eyes were hurting and he did not want to join his son and myself in a walk. We left him and his daughter Ishbel playing a game of pin bagatelle.

Although H. G. Wells did not come to Rothamsted he was a good friend to us and I met him periodically in town and elsewhere. The first occasion was at the Reform Club sitting at the head of his favourite table at the top of the staircase surrounded by a group of friends; the discussion had reached the point that the ills of society could never be cured until money was abolished. He was a firm believer in the ability of science to solve all human problems though he was sometimes impatient with scientists: 'There is more personality in a third rate actor,' he once rather petulantly told me, 'than in all the Royal Society put together.' Of course I could not agree nor did he expect it: our most difficult problems today are, in my view, moral and religious, on which science can throw little if any light. And he did not sufficiently allow for the scientist's unconscious habit of sinking his personal ideas and feelings so as to take a detached and completely unbiased view of his results, nor for the effect of the recognition that these results can at best be only a partial expression of the reality, the whole being completely beyond our powers of apprehension. For many scientists, too, their work is their life and they feel little need for further self-expression though there is of course for relaxation. At Canberra in 1939 we were both guests of the Governor-General, Lord Gowrie, and his Lady. Our last meeting was at his house at dinner not long before his death: he was anxious about the future of a Russian refugee for whom he wanted me to find a post: I had been able to do this for a certain number during those troubled years.

Men of science have long and with marked advantage made a practice of dining together before or after their meetings, and I was early privileged to join some of these groups. The select Chemical Society group of the early 1900's was dominated by the lively personalities of Rudolf Messel, not yet stricken by the paralysis that later afflicted him; Chaston Chapman, the rotund and jovial consultant full of lively stories of chemical frauds and brilliant successes; and H. E. Armstrong, who in an intense degree embodied the characteristics of the nineteenth century scien-

tists: the deep respect for some (but not all) of his seniors; the dispassionate and often pitiless criticism of some of his contemporaries; and the readiness to help a worthy junior. He dearly loved controversy but was annoyed when he failed to carry his point: he had a pungent style of writing. He was a very successful teacher and many of his pupils had distinguished careers. His interests were very wide, covering the whole range of science including agriculture, horticulture, biology, chemistry, geology and physics and extending to such diverse things as the opera and irises. I always thought of him as the last of the encyclopedists.

About this time the biochemists were feeling that they should organize themselves, and at the Savile Club, to which I was afterwards elected,—one of the friendliest of London's Clubs—I met old Dr Plimmer, the physiologist, picturesque in his brown velvet jacket, bushy hair and curly beard; he was one of the last of the aesthetes and had a fine taste for good food and choice wine. His son-in-law R. H. Aders had in respectful admiration added the name Plimmer to his own; he and Gardner were the moving spirits in organizing the Biochemical Club. We visited each other's laboratories, read and discussed papers, then lunched or dined together. William M. Bayliss frequently attended; he was one of the kindest and gentlest of men I ever met; friendly, accessible and ever ready to help a younger man. F. Gowland Hopkins, always affectionately known as 'Hoppy', also came; supreme in his line of work he was one of the most modest of men, extremely helpful to younger people and adored by his students; he was, too, a keen Freemason.

The Biochemical Club proved so successful that it was transformed into the Biochemical Society, and three of us were deputed to negotiate with Benjamin Moore of Liverpool for the purchase of the Biochemical Journal. The negotiations were prolonged and difficult; Moore was a very charming, able, but elusive Irishman, and it was long before we could get a satisfactory agreement.

The oldest and most distinguished of all these Clubs is the Royal Society's Dinner Club to which I was later (1926) elected and in due course had the honour of being appointed Treasurer. From the foundation of the Society in 1660 some of its members

dined together before or after the meetings, and the Club has a continuous history since 1743. These dinners are among the most interesting I have ever attended.

Three events in 1922 greatly pleased me. My old Universities of Wales and of Manchester conferred on me their Honorary Degrees of Doctor of Science: the first of a list that afterwards expanded. In May I received a letter from the Prime Minister, Mr Lloyd George, saying that the King had conferred upon me the honour of Knighthood. The accolade was to take place on the morning after the Manchester ceremony, and Mr E. D. Simon, then Lord Mayor and afterwards Lord Simon of Wythenshawe, who entertained the honorary graduands to dinner, kindly allowed me the use of the sleeper always reserved for him on the night train to London so that I was able to present myself fresh and rested at Buckingham Palace. Afterwards I had to hurry back to Cambridge, for the Royal Agricultural Show was on, and Elnor and I were guests of our old friend, A. C. Seward, the distinguished botanist and Master of Downing College, where again I met a still older friend, F. B. Smith, who having left Wye in 1902 to organize the new Agricultural Department in South Africa under Louis Botha and Jan Smuts had now returned and become Bursar of the College.

CHAPTER XI

The Sudan *Helping in a Great Scheme*

IN 1922 I met Sir James Currie, an old Sudan Civil Servant who had become Director of the Empire Cotton Growing Corporation, a body which sought to reduce our dependence on the United States for our supplies of cotton by encouraging greater production within the Empire. From the time when Kitchener liberated the Sudan from the Mahdi, in 1898 British experts had recognized the suitability of the Gezira, a great plain south of Khartoum, for irrigation and the growth of cotton, and the Staff of the Department of Agriculture set up there had confirmed this. The Sudan Government and the Sudan Plantations Syndicate jointly proceeded to construct a great dam at Sennar on the Blue Nile and to lay out the irrigation system while the agriculturists worked out suitable methods of cultivation and cropping. The Corporation interested itself in the scheme and jointly with the Syndicate and the Government invited Dr H. Martin Leake, the Indian cotton expert, and myself to spend the winter of 1923-4 in the Sudan studying its agricultural possibilities and then to report on the scientific organization necessary to ensure their fullest development. Accordingly on October 31st, 1923, Elnor and I started off from Victoria and travelling via Trieste and Cairo reached Khartoum in eleven days.

The very able Director of Agriculture, R. H. Newison, had already found for us that *sine qua non* for tropical travel—a good personal servant, Abdl Hamid, who having made the Mecca pilgrimage was entitled to wear the badge and be called Haji. He was a man of character, and looked after us faithfully.

Our official centre was Khartoum, a new city built on spacious lines by the British, where mosquito control was so complete that a resident was fined if one was found in his garden; but most of our time was spent elsewhere. The country to the north did

not greatly interest us; it is almost rainless and its population is confined to the riverside where peasant irrigation is practicable: little development was possible here. The central section has more rain, varying from 10 to 25 inches; from time immemorial it has produced short stapled cotton and its food crop has been *Sorghum vulgare*, widely grown in Africa under a variety of names: here it is called *Durra*. More was possible here. The villages are more scattered: as we entered the Headman came out to shake hands with us, a smiling crowd soon gathered and the women crooned a song of welcome. The well is the social centre where men, women, children, camels and donkeys gather: the women unveiled, in blue gowns that cleared the ground, in sharp contrast with the veiled women in trailing black gowns we had seen in Egypt. The well might be 'ten men deep', i.e. 55 to 60 feet: it usually had neither windlass nor bucket, and the water was hauled up in a leather square tied at each corner, then tipped into an earthenware vessel, and carried home on the woman's head. For larger quantities four-gallon petrol tins were used, carried by donkeys. Much of the lifetime of the women was spent in carrying water and we were told of the utter astonishment of some of the chiefs when on a first visit to Khartoum they saw fixed to a wall a small piece of metal from which when touched there gushed out a stream of water.

The Gêzira is in this region: it lies between the Blue and the White Niles, falling slightly from the former to the latter; its soil is black and deep: walking over it in the hot sun it looked friable and unlikely to give trouble on irrigation. But A. F. Joseph's analyses told a different story; it was not only poor in nitrogen and organic matter but it contained a high percentage of heavy intractable clay, and also soluble salts; under very careful irrigation these would keep the soil in good physical condition for an indefinite period; but any fault in management might easily reduce it to a hopeless state. Its vivid green crops, regular rectangular layout, and straight water channels, were in marked contrast with the surrounding brown, parched, dusty countryside. Each holding had its 'tukl', a round hut then made of durra stalks in which the cultivator and his wife lived; as he became more prosperous he built a second tukl, bought another wife and installed her there; two wives never occupied the same tukl.

Cotton was of course the chief crop, the others were durra and lubia; half the land was fallow each year. A good crop might have in it a skull set on a stick to warn off the 'evil eye' which is always watching out to injure the natives as much as possible. Children wore amulets with written charms inside them to keep it off. A baby or an animal could not be admired for this might call attention to it; the most that could be said was 'God being willing it might turn out well'. The cultivators clad in long white robes and white turbans tended their crops or watched their flocks grazing apparently bare fallow land; one might pass on the canal bank riding his donkey, the common native means of transport for the men—a woman usually walked, often with a jar on her head—the rider would dismount politely and stand aside to salute us as we passed.

There are three groups of Africans in the Northern Sudan: black Sudanese who form the majority, a mixed race, never rulers but not bad workers; the Arabs, who came in centuries ago and dominated the people, taking possession of the land, very courteous, but avaricious and at times cruel; and black West African Mahomedans, here called Fellata, on their way to make the pilgrimage to Mecca but staying in the Gezira to earn the necessary money, the pilgrimage being costly. Some remained for years, some for life. They are good workers, cheerful and fond of singing, and the women have a great sense of colour.

The cultivators were supervised by British Inspectors, magnificent young men of the old Public School type, respected by the cultivators for their just dealing and their efficiency, and admired by the Arabs for their skill in horsemanship.

We found the days hot and tiring but the nights were deliciously cool and restful; we slept on the veranda or the roof under a clear and brilliantly starlit sky; grass-hoppers were chirping, in the distance frogs were 'singing', still farther off in the village there was much human singing and beating of native drums; this died down but the vigorous barking of the pi-dogs continued: it was not checked because it kept off the hyaenas which might have caused considerable depredations, occasionally even taking a baby. Incidentally I learned that hyaena control was assigned to the entomologist. But the noise was so softened by the distance that it did not keep us awake; we were lulled to

sleep by the steady drip, drip, of water from the porous earthen water-cooler—a sound that has continued unceasingly all down the ages in the Nile valley. Fortunately we were well out of the village.

We visited also the Kassala region where cotton is grown on the sandy Gash delta in a way which I believe is unique. The river rises in the Eritrean hills but flows only during the rainy season, July to September, and canals have been made to distribute the water well over the land. After the flow ceases and the water has disappeared into the soil cotton seed is drilled in; it germinates rapidly, and as the water level sinks the roots follow it and never lose touch with it; the plant may receive no water during its eight or nine months of growth but it stands up well: we saw little or no wilting even in the mid-day heat. The crops are good.

The Gezira and Kassala regions produce the long-stapled cotton much in demand in Lancashire but producible only in restricted regions where its rather exacting requirements are met. Elsewhere in the Sudan, for instance in the Nuba Mountains, rain cotton could be grown at much less expense but at much lower levels of yield and quality.

In our report Martin Leake and I emphasized the need for a competent scientific staff to ensure continued productivity and we suggested an organization that we thought suitable. A chemist should carefully watch for signs of soil deterioration in the Gezira. A plant breeder should seek varieties better suited to the conditions or markets, giving better yields or proving more resistant to pests, diseases, and soil troubles than the Egyptian varieties then used. A seed farm should be set up to propagate supplies of pure seed; it should be sufficiently distant from the main block to avoid accidental cross pollination and disease contamination. Other necessary officers were already on the spot. Owing to the poverty of the Gezira soil we recommended that the effects of sulphate of ammonia should be investigated, and that improvement of the livestock should be undertaken when more was known about their diseases: this would not only add to the revenue—Egypt being a good market—but would supply manure for the cotton.

One of our Rothamsted Staff, E. M. Crowther, spent the fol-

lowing winter in the Gezira starting off the soil investigations there. The link thus established was kept up during the whole of my Directorship.

In spite of a heavy programme of work Elnor and I visited many places of interest. At Omdurman we met Osman, the antique dealer who had fought against the British at Omdurman and been slightly wounded; when the day was lost he and his fellows expected to be massacred according to the custom of the country. But instead the British bandaged their wounds, gave them tea with sugar in it (here much smacking of the lips, sugar being a great luxury) and let them go. Like his fellows he was dazed and thought there must be some devilish intention somehow, but unlike them he quickly grasped the commercial possibilities of the situation. If the British would not slaughter him, perhaps they would trade with him; so, speedily collecting all the Khalifa dollars, Dervish spears, 'Omdurman antiquas' and other commodities he could lay hands on, he set up a stall in the Square and before the night was out did a great trade with the British troops bivouacking there. On another occasion we were taken to a native college in the desert for the training of Holy Men of whom there were a large number; the pupils enter at the age of ten and discipline is strict. At the door was a whip and a mat on which the victim knelt. One bright eyed boy of twelve had run away but had been caught and brought back; he had chains on his ankles but did not seem abashed.

Our most interesting expedition was the 1,700 mile farther up the Nile by steamer to Rejaf in the extreme south as far as the Nile is navigable: the journey took fifteen days there and ten days back. It is devoid of scenic attractions, there are no hills to break the monotony of the endless parklike plain with its many flat-topped acacias. There is, however, much animal life: birds of many sorts, big game, including herds of elephants, giraffes, water-buck, crocodiles, hippopotami and prodigious numbers of insects, especially in the Sudd, a vast marsh of papyrus, but with some ambatch and other trees, in which the river loses something like one half of its water. The great attraction of the journey is its human interest. The Arabs never settled there because their horses could not tolerate the insects, no one gets right into a wholly different set of tribes: pagan, and hardly touched by our

civilization, but having a culture of their own far older than ours. They lived mainly on fish and river animals especially hippopotamus, and seemed extraordinarily insensitive to ptomaine poisoning; they would not slaughter their cattle for food, these being a mark of social position, parted with only as Bride Price or in expiation of offences, but they ate the bodies of those that died whether from disease or other causes. Christian missionaries are allowed to function here but not in the Moslem north; we met several and were much impressed by them. In some of the villages no clothes were worn or at most only a string girdle, and the children brought out their parents to laugh at us in our ridiculous get-up with sun helmets and sun glasses. I was introduced to a Dinka chief as a person of some consequence; he asked: how many cattle had I? Fortunately Rothamsted then had a sizeable herd so I was able to give a satisfactory reply. In our last village beyond Rejaf we made friends with some boys from the Mission School at Juba; seeing us coming they had put on their school uniform, shirts and knickers. We sat on the veranda of the chief's hut opposite the witch doctor's pole and talked about the events of the village: the smallpox that had decimated it but spared them, the disease that was afflicting their cattle, the hyaenas that were eating their sheep and goats, having already eaten the dogs that were supposed to guard them. But that the events were different we might have been talking to boys in an English village: it was not until they pointed out to us their mothers, naked but for some necklaces or girdle from which hung some beads or thin pieces of iron, their bodies smeared over with red and smoking long pipes or spreading out a mixture of cowdung and durra porridge to dry preliminary to making beer, that we realized how great is the advance these devoted missionaries have already made. One of the boys wrote to me afterwards telling me how their little group accompanied their menfolk in an elephant hunt: 'the elephant turn round and see Lado's brother behind him and then run after him as fast as he could and the boy was caught. The animal did not do anything very much to him but trod on his foot, and push his great tusk into the boy's stomach and the boy fell down dead.' As the boys grow older the tribal law claims them and we wondered how much of their early training persists.

During this visit I was struck by the fact that we in England knew but little of the scientific work being done in the Sudan, and the workers there in turn knew little of our work, and had but few of our publications. On the other hand they were well provided with the bulletins of the United States Experiment Stations which were widely distributed over the world. In consequence they tended to use American methods and American appliances, even when better were available in this country. Quite unnecessarily they were looking to the United States for help and leadership in agricultural science. All this seemed highly undesirable, and on my return to England I took the matter up with the Ministry of Agriculture and suggested that a conference of the Empire workers in agricultural science should be called to discuss means of overcoming the difficulty. This was held in October 1926, and several Imperial Agricultural Bureaux were set up for the purpose of keeping the various agricultural departments in touch with each other and with scientific and technical advances made elsewhere.

Twenty-seven years afterwards, in 1951, Elnor and I were back in the Gezira. The Syndicate was winding up, its concession being ended; the Inspectorate and scientific staff were being disbanded and the services 'Sudanized'. The British staff had rendered magnificent service. The soil of the Gezira, which might so easily have been ruined by faulty irrigation, had if anything improved in productiveness as the years went by, and the yield of cotton in 1950-51 had been the highest in the whole period. The plant breeders had raised new varieties of cotton, better in quality and yield capacity, resistant to pests and diseases that would otherwise have done much damage. The efficiency of the business managers had ensured that the cotton had been sold to the best advantage and the cultivator had received his full share of the profits. The scrupulously just and honest Civil Service and Law Courts had ensured peace and prosperity throughout the country. There were now more railways, better roads and motor transport; the tukls were no longer of durra stalks but of solid materials; schools were flourishing, and the desire for education even more so. Liebig's had set up a meat factory at Kosti, thus opening the way to the livestock developments that could do much for the improvement of agriculture and the wellbeing of

the people. When the British staff took charge of the Sudan in 1900 it was truly described as being 'always poor and it always must be . . . a God-accursed wilderness, an empty limbo of torment for ever and ever'. They are leaving it completely transformed into a land that can give its growing population a satisfying life and enable them to contribute to the general welfare of the world.

Troublesome political problems are bound to arise as the efficient and incorruptible British officials are withdrawn. Administration of a multiracial community is always difficult, and the three great groups of the northern part have little in common with each other except their religion, while those in the south differ in every way, and traditionally hate the Arabs of the north: for it was the Arabs who in the old days had been the slave raiders, and the memories of those times still survive.

CHAPTER XII

Canada and the United States *Three Visits*

IN September 1924 the British Association were invited to meet at Toronto, and the Council appointed me President of the Agricultural Section. Hearing of this the University of California invited me to give the Hitchcock lectures there, and my old friend Jacob Lipman of the New Jersey Experiment Station arranged a tour of the chief Experiment Stations at which I was to lecture at \$50 a time. So Elnor and I started on our journey, official guests in Canada, and travelling through the States like mediæval scholars, earning our keep as we went.

At Toronto we were guests of Sir Clifford Sefton, who had been one of Wilfred Laurier's Ministers. Our fellow guests were Sir William Bragg, his wife and daughter. I always liked and admired Bragg; he was not only a great scientist but extremely human and there was no one to whom I would more readily have gone in time of trouble. He was modest and unassuming, with an enviable capacity for getting results and presenting them clearly and convincingly. He was one of the most attractive men I ever met—and this attractiveness was shared by his wife and daughter—and, I might add, his son. During the course of the meeting the University of Toronto conferred upon me the degree of Doctor of Science, *honoris causa*, of which I have always been very proud.

We were overwhelmed with hospitality and Elnor greatly admired the intense patriotism and efficiency of the Toronto ladies.

We visited the great fruit region on the Lakes. St Catherines was producing quantities of wine and managed to sell it although Canada and the States were then officially dry. Cases of twelve bottles could be bought in Canada but not shared: the Mayor could not give us wine at lunch, but took us to the factory

afterwards to 'sample' it. To the States however it had to go as Portland Cement or, in some other guise. We went also to the clay belt of Northern Ontario and saw some of the new towns springing up each with its large public buildings, school, library, hospital, etc., all complete even though there might be only three or four thousand inhabitants: and consequently a large public debt endurable only if more and more people could be induced to go and live there, so sharing the burden. Thus arose the inducement devices: the strips pasted on the back of the local patriots' cars: 'Boost for Walla Walla'; the seductive little pamphlet setting out the fifty points that made New Liskeard the most delectable spot in Canada. Once expansion ceased the burden of rates might become insupportable.

Then we went on to the prairies. There had been great developments since 1909. Winnipeg had greatly expanded; Calgary, then a town of two streets only, was now a city with all the appurtenances and assertiveness of the west, with its 'Palace of Eats', 'Nobby Sutorium' (tailor), 'Shoeshine Parlor', 'Shoe Hospital' and 'Funeral Parlor', while another establishment heralded in the glowing description of its wares by the announcement that 'Modesty has had its day'.

I was greatly interested in the northern park-like country of Saskatchewan and Alberta, where mixed farming is possible, while on the actual prairie only wheat or oats could be grown. The motor car had almost entirely displaced the buggy, big farm machinery had gone far to solving the labour problem and no longer were ship-loads of harvesters brought over. Boosting was a national pastime; a farmer would declare that his was the finest farm in the finest Province of the finest, etc., etc., and then proceed to offer it at \$50 per acre. In Manitoba we visited a section where farmers practised stock jobbing, buying 900 lb. cattle at 3½ c. per lb. in autumn and hoping to sell at 8-10 c. per lb. in spring (the £ was then worth \$4.80). Our Winnipeg friends had warned us against being 'soaked', but in any case we were not buyers. We had a most delightful camping holiday in the Rockies with Miss Elizabeth Blackwell of Holloway College, J. H. Priestley, A. B. Rendle and Archibald West of Edmonton University; and then Elnor and I with Lord Bledisloe and his son left the main party and struck southwards into the States,

entering by the Red River Valley, stopping at Fargo in Dakota where I gave my first lecture and was made to realize the intense specialization among the staffs of the experiment stations ('If it's live hogs you talk to me; if it's dead hogs you talk to the Doctor here; if it's food for them you want Professor X', etc.). Then to the Yellowstone Park for a few days, the wonders of which it is difficult to exaggerate: we stayed in the camps where each evening the lady hostess would give us song books and set us 'community singing'; later came dancing, corn popping at the fire and other frivolities. The camp was run by students; it was held both in the States and in Canada that a student should have grit enough to work his way through college without State aid beyond the fact that there were no fees: he would need to earn about \$700 a year and many possibilities were open.¹

We next went to Utah, a State I had always wanted to visit because it started as a monothetic religious settlement, all its people in the first instance being Mormons, and they still predominated and retained control though increasing prosperity brought a considerable inflow of 'gentiles'² to Salt Lake City. Dean West was our guide. The climate is arid, but the two valleys in which the population is mainly concentrated—the San Pete and the Cache—are well watered. Three things struck me at once: the firm belief of all we met in their Church; their high standard of education ('a man cannot be saved in ignorance' was one of their tenets); and the closeness with which they could co-operate. This gives them a remarkable degree of coherence and effectiveness which however, as in the parallel case of the Jews, does not always add to their popularity. Their irrigation practice is remarkably good, and I was much impressed with their experimental station at Logan. One of its results greatly intrigued me as being so different from our own: the growth of lucerne did not increase the nitrogen content of soil, while ploughing-in wheat stubble did.

Dr Widstoe, a friend of long standing, whom I had first known as an agricultural scientist of distinction, but had now

¹ This still holds true: I was informed in 1955 that only about 20 per cent of the students at Canadian Universities were receiving grants, the remainder finding their own resources. In the United Kingdom some 80 per cent receive grants.

² The name for non-Mormons: it includes Jews.

become one of twelve 'Apostles' of the Church, explained to us their doctrines. At Salt Lake City we attended an organ recital in the remarkable Tabernacle: a large oval building made of wood by the early settlers, but joined with wooden pegs, nails being then unobtainable. We had to leave before the end to catch our train, and although the Railroad chief who was present offered to hold it up for us, we felt we had no claim to so marked an attention.

Our next stop was Berkeley, where, at the University of California, I gave the Hitchcock Lectures and in betweenwhiles was motored round the State. Here I found a glowingly enthusiastic local patriotism before which all I had previously met paled into insignificance. The University however was a haven of peace, and it was a great pleasure to meet the quiet, thoughtful D. R. Hoagland, his delightful colleagues J. S. Burd and J. C. Martin, and the Head of the faculty, the versatile and genial C. B. Lipman. The research work was among the best I saw during the whole journey, worthily maintaining the high standards set up by the founder E. W. Hilgard, whom to my regret I had never known. My audiences showed in a marked degree that all-embracing curiosity so characteristic of American listeners at their best, and which so pleases a lecturer: the discourses were afterwards published by the University Press under the title *Plant nutrition and crop production*.¹ We left with the greatest regret.

But California still had more to offer us: at Fresno—which even then seemed blocked up with cars—W. P. Kelley, one of the most ingenious minded of the research group, showed us his work on reclamation of alkali soils by treatment with sulphur, and at Pasadena we were invited to admire (from the outside) the lordly residences of the Tooth Paste King, the Chewing Gum King, and other monarchs; then Professor R. A. Millikan showed us his magnificent laboratories at the Institute of Technology and told us about his work on cosmic rays. We also received invitations from Charlie Chaplin and Douglas Fairbanks to visit Hollywood and see their studios. Of course we went with alacrity

¹ This was translated into Armenian. I sent a copy to our translation bureau to see what they could make of it, but it was returned with the comment: 'Sorry, but we don't read fretwork'.

and had a most delightful time. Fairbanks we found was a realist, with a large open air studio, reproducing scenery and effects with 'photographic fidelity'; he was very athletic and really did the amazing feats shown on the screen. In preparing *Robin Hood* he had sent a trained archaeologist to England to study details of castles and to search records at the British Museum for precise information. He was not keen on colour or stereoscopic development: the proper medium, he thought, was black and white. Chaplin however was completely different. He was no realist. He had no desire to give an exact and faithful reproduction of the thing itself; his aim was to reproduce the atmosphere and the sensations one would feel if one were sharing the experiences depicted. Among other devices was a small stage reproducing exactly the scenery of the larger one but mechanically mounted, so that the most unlikely events could happen, and the film was so well made that it was impossible to tell where the change from the real stage to the miniature was made. He was then preparing *The Gold Rush*, the action set in Alaska, but he was not perturbed that his mountains might not resemble the real ones: if anything he considered them better, and when I suggested that snow could not rest as he showed it at one place his only comment was: 'But that shows the superiority of my snow over Nature's snow, because my snow can rest there'. He was completely different from what I had expected: interested in the philosophy of art and, like Fairbanks, conscious of the power the cinema exercised over the democracies of America and Britain and anxious that it should be used for good.

We then started eastwards, lecturing at some of the colleges *en route* after the college yell had duly been given, and making numbers of speeches to the many different kinds of clubs: Rotary, Kiwanis, Sigma Psi, fraternities, sororities and others; meeting many delightful people and crowding all the hours between breakfast and midnight with varied activities. The informality of the students surprised me: as the College President passed them there was no deferential making way or raising of hats; either they took no notice or just said: 'Morning, Doc.' In some cases, I was told, the students called the Professors by their Christian names. Further I was assured that many of the Professors would have gained financially by giving up their

chairs and working at a garage. The Universities are great mono-collegiate establishments; some of them had ten or twelve thousand students and several of the Presidents told me they thought this was too high: they did not like the application of mass production ideas to education.

Our last engagement was at Washington where the very courteous Dr Allen of the Department of Agriculture arranged a strenuous but most interesting programme. Finally we were invited to White House to meet President Coolidge who as a farmer's son was deeply interested in agriculture and, like the Minister whom we had previously seen, thought that the United States should aim at exporting valuable agricultural products such as bacon and cheese rather than wheat; but as home consumption was increasing there might before long be no surplus for export.

Throughout our journey we found a lively interest in Great Britain. The British professional and business men were held in high repute but the working man was not, and many were the instances given us of the very superior output of the American worker owing to the absence of the restrictive practices which were supposed to clog the British industrial machine.

1926 opened very sadly for us. On the last day of the Christmas holidays Francis and his sister cycled to Welwyn Garden City to see the new bookshop: we had none in Harpenden. Snow began to fall, and as they were returning home and riding down a steep and narrow lane they met a motor car coming up. Francis could not avoid it; he crashed into it and was shot right over it; he was picked up suffering from concussion. No ambulance was available and he was taken in a van to the Harpenden Nursing Home. Elnor hurried there as soon as she heard of the accident but was not allowed to see him; by the evening, he was dead and was carried home.

He was sixteen, and combined considerable ability with an unusually happy disposition and sense of humour that made him a universal favourite. It was our first great sorrow; Elnor stood the terrible shock bravely.

In 1927 I was back again in the United States and Canada on

a very different programme. In the early 1920s some of the European soil scientists decided to form an International Society of Soil Science which could organize meetings for discussion and consolidate the soil mapping of Europe, then proceeding in a rather desultory way. I have always been rather slow in appreciating the significance of a new movement and I did not at first join in. Jacob Lipman and other United States soil scientists, however, took a more favourable view and invited the Society to hold a Conference there in July 1927, and to heighten its importance had the invitations sent out at diplomatic level so that the members went as official delegates of their Governments. Eight were sent from this country: the three from Scotland, being paid out of a different vote, managed to get a higher expenses allowance than was allotted to their less fortunate English colleagues, among whom were B. A. Keen, E. M. Crowther, G. W. Robinson and myself. I went earlier, and Lipman as before arranged a lecture tour for me, so again I wandered round the eastern and central States like a mediaeval scholar. I was impressed by the appearance of greatly enhanced prosperity as compared with 1912 and even 1924. Buggies had gone, bicycles were rare, cars were everywhere. Students had their cars, gramophones and wireless sets (rare in English colleges then) and their functions had become costly: the dinner jacket—tuxedo—was more often *de rigueur*; at one dance each girl guest was given a \$12 camera, and the total cost worked out at about \$50 per head. Farmhouses were better furnished and the gardens improved; farmers spoke most enthusiastically of their positions and bankers and merchants whom I met at the various lunches gave glowing confirmation; a casual impression was that they were vastly better off than our farmers.

Further inquiry however, showed that here too there was trouble; the students' cars etc., were only acquired on the instalment plan, many farmers were in a bad plight and 'boosted' their farms in the hope of selling them, many of the banks had mortgages on the farms and the merchants had second mortgages: neither wished to cheapen the value of their assets. In one State a chain of banks broke leaving their customers in a sad plight. The 1926 Census showed that 649,000 people had given up farming in that year, the biggest drop since 1920. However,

none of this came to the surface, nor did it in the slightest diminish the generous hospitality shown everywhere.

The hospitality was made more embarrassing by the circumstance that the Prohibition Laws were in force and I who dislike spirits intensely was in the difficulty that if I refused them (as I could without offence in pre-Prohibition days) my hostess took it as a reflection on their quality and would assure me that they were all right, and from her own bootlegger. Nutrition consciousness was spreading also; in the popular Child's restaurants the calorie and vitamin content of the different dishes was stated on the menu and the waitress was prepared to advise about suitable combinations. Numerous labour saving devices made life for the housewives much easier than in 1912; the fatigue of cooking was reduced by the increasing use of canned foods which were claimed to contain more vitamins than fresh foods. All this left leisure for promoting causes or sitting on the veranda in a rocking chair reading a voluminous paper or a magazine; not as a rule a book.

During the journey I received intimation of two great honours which gave me much pleasure: the University of Maryland proposed to confer upon me the degree of Doctor of Science, *honoris causa*, and the Athenacum Club elected me a Member.

The Conference was held at Washington, D.C.: it passed off well but its distinctive and most memorable feature was the journey right across the States by the southern route to California and back through Western Canada to New York. We were 250 persons, men and women, from thirty countries and speaking about twenty-five languages; we had a special train on which we lived and slept for just over thirty days. The whole cost was borne by our hosts. The route had been drawn up by C. F. Marbut, Head of the United States Soil Survey, and he remained our leader. He was well fitted for the role. He had a vast knowledge of the soils of the United States, and had elaborated methods for mapping them which proved to be useful in other countries including our own. But he had little enthusiasm for anything else, and had planned to make the excursion of pedological interest only; here, however, he was over-ruled by his colleagues who insisted that we should see something of the attractive scenery and of the agriculture of the country. He was tall, of

spare build, wore a small moustache, was of rather retiring disposition, abstemious and austere—traits which he probably derived from his Unitarian forebears. He had great charm of manner and though not an accomplished linguist he was free from self-consciousness and so could use his limited vocabulary to the full. He was ably supported by Oswald Shreiner of the Department of Agriculture at Washington, who quietly but indefatigably smoothed out the many difficulties that began to arise as the heat and dust of the journey increased. I had long known and esteemed his pioneering investigations on soil organic matter, and was greatly attracted by his kindly helpfulness. The permanent secretary and Vice-President of the Society was D. J. Hissink of Holland, who had been in charge of the soil investigations of the Andijk Experimental Polder, the pilot scheme for the reclamation of the Zuider Zee, and had done valuable work on base exchange; he was also our best linguist, speaking fluently English, French, German as well as Dutch. He wore a straight beard which he had the engaging habit of combing whenever he was excited or in trouble; he was ever anxious to preserve his dignity and, as an indefatigable worker for the Society, fully earned the respect always accorded to him.

The Russian delegation was the largest, comprising some forty members. The scientific leader was K. D. Glinka, of the family of the composer; short, rather stout and bearded, of aristocratic bearing; he was said to speak beautiful Russian in his addresses. He and I always spoke French together, but I could never get any intimate conversation with him: he would always curl up when we got away from soil formation. S. Neustruev was the most distinguished-looking of the group: tall, always well-groomed, speaking English well, he was a born teacher, and taught me more of the Russian system of soil classification than any of the others. Like Glinka, he was of good family, but had been spared by the revolutionaries because of his scientific reputation. B. Polynov greatly interested me; he was of Cossack origin and claimed kinship with me in that his ancestors had probably been bandits, and mine on my mother's side were seafarers and in his view likely to have been smugglers. He had begun some good soil survey work in the U.S.S.R., and was already thinking about landscape problems. Tall, of powerful

build and resolute countenance, he was very outspoken: he was very lively and an excellent travelling companion. He spoke German well, having studied in Germany. Later I sent my son Walter to study under him. Also I liked the three Lebedeffs. He was short and stoutish, quiet and efficient: he had worked on soil moisture. His wife was an accomplished musician and one of the best types of Russian cultured women. Their son Nicolas, a young giant who in the West added a couple of feet to his tall stature by purchasing and wearing a Mexican hat, was an engaging youth, speaking English well and even writing English verse. I expected great things from him.

Then there was Anisia, a peasant girl from White Russia with whom I became very friendly. She was a child of the Revolution, saved from the famine which had carried off her parents and the rest of their family, sent to a school and then to college: her professor had chosen her as assistant and her colleagues had chosen her to go to the Conference. For her the Revolution was all in all and she hoped for the day when the down-trodden millions of England would be freed from their shackles. When I said I had never seen any such people her only comment was: 'You are one of the intelligentsia and don't know: we know because your Communist Party tells us.' She had avidly absorbed all the Communist doctrines and become a vigorous atheist. She was being looked after by one of the Polish delegates, the gifted Jadwiga Ziemińska, of Puławy who interpreted for us, with whom I formed a very happy and enduring friendship.

Besides the scientific members of the group there were a few others whose function, we understood, was to keep watch on their fellows; they were duly pointed out to us and we were properly discreet in their presence.

The kindness and hospitality shown us on the journey were touching and many were the 'Thank you' speeches I was called upon to make. At every town at which we stopped, however small, the citizens turned out in their cars to carry us round our route, and it was immaterial whether we arrived at 6 a.m. or at mid-day. I asked one of them 'Why do you do this?' 'We are not business men', but the answer was 'We know that, but we want you to remember our town with pleasure'. On hot dusty days there was the crowning hospitality of the baths. We had endless

chicken lunches and dinners and in Georgia were given a genuine barbecue, made by skilled men of colour who claimed that Georgia alone had the only true recipe—all others, we were told, were fraudulent. Peaches, water melons, apples and peaches followed, also a mysterious drink: some of our colleagues who feasted too well paid the penalty later. At Athens, the capital city, the Mayor told me as one of its outstanding and distinguishing features that it had a larger number of murders per 1,000 of population than any other city in the States.

The whole expedition was a triumph of organization. Everything went well and difficulties disappeared promptly as they arose: we were full of admiration for the thoughtfulness and efficiency of our hosts. Long before the excursion was over I was firmly convinced of its great value. These men and women of widely different origin and background, who at the outset were eyeing each other with some suspicion, were before long prepared to pool their stocks of scientific and technical knowledge and help each other in the solution of their technical problems. In moments of expansiveness some of the delegates would rail at the politicians who controlled their destinies—men who not infrequently were self seeking and ignorant, but astute and capable as demagogues—and wish that they could be induced to solve their problems equally effectively.

I decided that I must in future take a more definite part in international activities of this kind; at the lowest I should learn new methods and techniques and obtain highly competent criticism of our results and ideas, all of which would strengthen our work at Rothamsted; at the best we should be able to help some of the poorer countries to increase their food production and so contribute to their welfare and aid the cause of peace. There was the language difficulty, but I found that if I made myself fluent in French and German and got as far as I could with Russian, I should be able to do as much as my other obligations permitted. Refugees from Europe were already beginning to arrive in England, some came to Harpenden and we were able and glad to receive some of them into our laboratories. From among these I got help with my new endeavours.

Three years later I returned to the United States on the occasion of the 50th Anniversary of the Rutgers University when

I was invited to deliver the address and received the degree of Doctor of Science *honoris causa*. It was a brief visit lasting only eight days: my host was as before Jacob Lipman and my 'schedule' was very heavy comprising five lectures and addresses, several lunches and other official functions, visits to experiment stations and important farms. When at the end I related my performance his comment was 'For an Englishman that was not too bad'. I was much helped by his kindly chauffeur, a Jamaican, black and shiny as coal, beaming with smiles and intensely proud of his British citizenship. 'You're an Englishman, aren't you,' he said on our first meeting. 'Yes, Sam, I am,' I replied and we shook hands on it. 'So am I,' he said: 'You kin always tell an Englishman, can't you?'

Among my fellow graduands were C. F. Marbut and L. O. Howard, whom it was a great pleasure to meet again.

During this period I was offered a post in the City by a large organization: the work would be both important and interesting and the salary and prospects far beyond anything I could ever hope for at Rothamsted. Elnor and I talked it over carefully: we recognized its attractions, but she knew it was not the work I wanted to do and that I could never have been happy in City life. So we decided to stay where we were, and I have always been thankful for that decision.

I returned to Canada in 1933 as one of our Government's representatives at the International Grain Conference in Regina and stayed behind to make an agricultural journey with my old friend E. S. Archibald, the Head of the Canadian Experimental Farms. Regina gave us a royal welcome and the Conference was well attended. I had the pleasure of meeting George Bouchard, the French Canadian writer, whose delightful descriptions of life in French Canada I had thoroughly enjoyed. Regina had of course changed out of all recognition since my 1909 visit and it was good to see so much growth and activity. But I never could understand why it was planted there on the open, treeless, waterless prairie, when only a few miles away is the Qu'Appelle Valley, well watered and wooded, around which a beautiful city could have grown up.

Our visit happened in one of Saskatchewan's times of tragedy: the last three years had been very dry. Wheat, the chief crop,

had suffered greatly from 'grasshoppers' and from weeds, especially Poverty weed and Russian thistles. Such grain as began to form was shrivelled by the scorching wind; yields, it was estimated, were being reduced by about two bushels per acre per day. The heat was intense: 118 deg. F. in the shade was not unusual; it splintered the clay soils to dust which the fierce hot wind picked up, raising terrific dust storms so dense that it became pitch dark and so penetrating that unless we were careful our lunch was ruined. The clay soils are mostly solodes or solonetz; only the top few inches are readily cultivable and when they are blown away a hard intractable layer is exposed which completely defeated the farmers.

I was particularly interested in seeing how these difficulties were being dealt with because they are widespread and I had met them elsewhere. Experiments showed that the erosion could be lessened by strip farming, and the shrivelling by growing earlier ripening varieties—at the risk of a loss of yield if the season turned out normal. Chemical sprays were being tested against the weeds; the hormone herbicides were not yet discovered but when they were the prairie wheat growers took them up with alacrity. Phosphatic fertilizer was being used; it had failed in the earlier trials because it was broadcasted, but when 'placed' it proved effective. On returning to Rothamsted I tried to get a combine drill such as the prairie farmers were using, but failed: it was some years before they were made in England. The losses due to shrivelling and grasshoppers were reduced by cutting before the wheat was ripe, leaving it in the swath for some days, then picking up with a combine. Costs of production were being reduced by using enormous implements. On one large farm I saw a 10 foot disc plough doing 40 acres a day; a 28½ foot drill seeding 1,900 acres in 18 days: this required besides its operator one man to disc ahead and another to bring the seed. The farms were usually one section, i.e. one square mile (640 acres) in size and all in cultivation: one third fallow, two thirds grain, mostly wheat. One man sufficed to grow the 400-odd acres of wheat; he needed, however, two others at harvest time: the total cost was about \$10 per acre and the yield might be anything between 10 and 30 bushels per acre according to the rainfall. The summer fallowing now no longer aimed at producing the

fine soil mulch of the early days but left the surface rough and protected by the broken stubble.

I greatly admired the courage and pertinacity of the farmers in face of their very grave troubles: hard working men in black or dark blue overalls, some of them unshaven and unkempt, but they took the situation philosophically. 'We had seven good years and must expect some bad ones' was a common attitude. Banks and mortgage companies had lent up to the hilt. Many of the farmers felt they could not be in a worse plight: the Banks however could not sell them up as there were no buyers.

It is pleasing to think that things did improve; better seasons came along and the Government set up the Prairie Farm Rehabilitation organization to hasten recovery.

In our journeys through the Province the grasshoppers were at times in such shoals as to make travel difficult. They burst themselves on the windscreen leaving a whitish slime that obliterated vision, they clogged the radiator so that the water boiled, and as we ran over them on the road we were constantly slipping and in fear of dropping into the ditch. The wheat crops were singing with them and they caused appalling devastation; nor was any remedy available.

Dr Archibald and I then switched over to Quebec Province where we visited the French Canadian farmers and the Experiment Stations that served them. Here the situation was entirely different: it was cooler, moister, the farms were small and mixed; they were worked by the family and produced the family food; money was certainly not abundant, but there were few signs of the financial worries that beset the grain farmers of the West. I never learned Canadian French, but most of the farmers spoke modern French which is kept alive by a succession of priests arriving from the seminaries of France.

The little towns are dominated by the church, with its characteristic steeple (as distinct from the prairie towns which are dominated by the grain elevator): the streets are planted with trees and the houses have green 'volets', the little restaurants have tables outside where one can eat one's lunch: all reminded one of France. There were none of the big labour-saving machines of the west: I was fascinated by the bullock drawn reapers on the Ile d'Orleans, where M. Adelaid Godbout, the Minister

of Agriculture, and M. Roy, the Archivist, gave me a delightful long afternoon. Life was undeniably hard, and there was little money, but there was abundance of food and of wood for fuel, and everywhere a cheerful atmosphere; 'in the evenings we dance for miles' one of the young people told me.

Children were many and periodically it was necessary to found a new township. The priest—the leader in all important activities and usually a very genial soul—collected a complete and self-contained group which then migrated in a body to a pre-arranged site: an organized demographic settlement held together by the powerful bond of religion in marked contrast with the haphazard settlement in the west; I was reminded of the Mormon settlements in Utah. Dr Archibald took me through the other Eastern Provinces: most of them also in small family farms, and I was greatly impressed by the stability of this system of organization. On each of my visits to the West farmers had offered to sell me their farms but this never happened to me in the Eastern Provinces. One farmer on Prince Edward Island, told that he could get better paid work elsewhere, had only replied: 'But why should I leave the Island?' However, a later visit showed that here too change was coming about.

I was also reminded that Canada has an historical background for at St John, New Brunswick, I was told of the celebrations in the previous May of the 150th Anniversary of the Loyalists who, wishing to remain under the British flag, had left the United States when it seceded in 1783. At Grand Pre, Nova Scotia, we heard much of Longfellow's Evangeline, now become a tourist attraction, and farther on we heard of rejoicings because a local lumber firm had just received an order for 50 million ice cream

CHAPTER XIII

Palestine and the Jewish Colonies *1927 and 1928*

I returned from these visits to Canada and the United States with a mass of new ideas and information and, still more important, with a mental picture of the order of significance of many agricultural scientists who had previously only been names to me. Much of my time was still absorbed in building up the subject in my book *Soil Conditions and Plant Growth*, and I was now able to broaden the foundations and to fill in many of the gaps. Also I brought together the results of fertilizer trials at Rothamsted and elsewhere and put them into systematic order in a publication of the Ministry of Agriculture with the purpose of furthering investigations into the effect of soil and climatic conditions on fertilizer efficiency. We began experiments with sugar beet in 1927; E. M. Crowther took charge, and in the course of the next sixteen years assembled a remarkably complete mass of data which unfortunately he never lived to set out in final form. H. V. Garner was conducting systematic experiments on potatoes.

The application of the methods and concepts of Plant Physiology to field experiments which I had been very anxious to see developed was making good progress as a result of the friendly co-operation with Professor V. H. Blackman of the Imperial College, South Kensington. F. G. Gregory was in charge of the small laboratory he had set up alongside of us, and we had a succession of plant physiologists working in the field, beginning in 1923 with E. J. Maskell, then W. O. James followed by A. R. Clapham, all of whom later achieved much distinction, finally in 1930 D. J. Watson joined us and by physiological methods has extracted valuable information from field experiments that the older methods could never have discovered.

It was not long, however, before I was abroad again. The

Empire Marketing Board under the energetic leadership of Walter Elliot was promoting agricultural developments in various parts of the Empire, and asked me to visit Palestine, then administered by this country under a mandate, and advise whether the agriculture could be so improved that the holdings could be reduced in size so as to allow room for both Jews and Arabs. John Boyd Orr was studying the animal husbandry problems, and his very competent assistant, John Crichton, was experimenting on calf rearing.

I made two visits, one in 1927 and the other in 1928, each time in April when the 'latter rains' so potent for the crops were over and the hot dry summer was coming on, pleasant enough till the scorching dust-laden wind from the desert raised shade temperature in places to over 100 deg. F. My guide, Dr Elazari Volcani, had a remarkable knowledge of the colonies and told me much about the days of Turkish rule when, if he wanted some concession for the colonists, he would apply to the proper official who would withdraw for a few minutes to think about it, he would then put notes for £10 or £20 on the official's desk and leave the room; after a few moments he would return; the notes were no longer there and he would be told either that his request was granted, or that the matter required further consideration (which meant a further dose), or that it was refused, which meant that a rival had gone one better.

The colonies were very western in appearance with their little rectangular red-roofed houses set in gardens; the children especially pleased me: bright, attractive, healthy, much less afflicted with eye trouble than the Arab children; as I left the house they would give me some flowers and wish me 'Shalom'—Peace be with you. Unfortunately while I could often talk to the parents I could not talk to the children, which I should like to have done, as they spoke only Hebrew; a Commission was engaged in bringing the Old Testament language up to date. At one house the lady had changed her name: she had been ill, and knowing that at the beginning of each year the names of those that are to die are written in the Book of Life, she had changed hers so that the Angel of Death, if he came, would fail to recognize her and pass on. The holdings were mostly small; twenty-five acres was a common size, but the characteristic feature of the settlements

was their systematically planned development. There had been no haphazard shack stage; good concrete houses and buildings had gone up from the start and the colonists had been spared the hardships of early settlers elsewhere by receiving generous remittances from Jews in the United States and other countries. This is still Israel's economic position.

I was extremely interested in the various types of settlement: the individualist, somewhat like ours; the co-operative, somewhat like the Danish; the collective communal—the *Kibbutz*—where work is collectively organized, all property and earnings are collectively owned, all live together in one establishment and there are no private houses or home life; and the collective non-communal—the *Moshav shitufi*—where the family has its own house. The newcomer has thus a choice of social organization and can join any group he wishes if they will accept him. It is a remarkable experiment and well deserves close study. The collective system is of course Communist, and many of the colonists were from Germany or Russia, having escaped from a pogrom: several of them told me they had no idea whether their families were alive or killed, as the pogrom had broken out suddenly while they were dispersed at their work and they dared not return home. But they were careful to explain at great length—for they had all the Communist love of voluminous disquisition—that they were 'idealistic' and not 'political' Communists; they had no evangelizing mission but simply wanted to lead their lives in their own way without disturbing or exploiting other people or being disturbed or exploited by them. I was attracted by their sincerity and could not help liking some of them, though I was thankful that I did not live with them as I found their domestic inefficiency rather tiring and soon wearied of the discomfort, the swarms of flies, the tea cups with broken handles and the beverage which might have been either tea or coffee. But it was the high-brow negligence of the ideologist, not slatternliness.

I met numbers of *hakutim*, enthusiasts who had sacrificed positions and prospects in western lands and were dedicating their lives to the building of the National Home. Many of them retained their intellectual curiosity and kept alive the lamp of culture; my chauffeur carried with him a Hebrew book on philoso-

phy which he studied diligently while I was doing my work. For many of the colonists domestic tragedies, the results of persecution, had been the background of their experience before they came and had coloured their whole outlook. Sometimes the tragedy had happened very early in life: on the journey out I had made friends with a Turkish Jew boy of nine and a half who spoke French well; his father had been murdered when he was four but he escaped by being hidden; he was not told till he was six, '*quand de pouvais entendre ces choses*'

I was full of admiration for the reclamations already accomplished by the Jewish organizations in which rivers from the hills that had petered out in marshes were being rectified, the marshes drained, the land brought into cultivation, and the water used for irrigation, pestilential tracts thus being changed to good farm land. But the work was hampered by Arab grazing rights; the Arabs cared little about the mosquitos and their animals were insensitive to the ticks and the tick born diseases. It was extremely provoking. Afforestation of the hills was badly needed and was being well done, but again the grazing interfered, the goats being especially destructive.

I visited also some of the Arab holdings. The orange growers were cultivating well, but the ordinary farming was very primitive. A nail plough drawn by a camel or a camel and a donkey scratched the surface; the grain—wheat or barley—was reaped with sickles, the yields were low. Livestock were not wholly for use but were also marks of social consequence. The villages, often perched on top of a hill to escape malaria, were crowded with flat roofed houses with very small windows and built compactly for better defence against marauders. The nomad Bedouin were disliked equally by the Arab farmers and the Jews because they stole the grazing and their livestock carried diseases, though the Department tried to prevent the spread. Yet another group, the gypsies, picturesque but arrant thieves, instead of contenting themselves with the generous allowance of grapes and corn permitted to travellers by Mosaic law,¹ disre-

¹ 'When thou comest into thy neighbour's vineyard, then thou mayest eat grapes thy fill at thine own pleasure, but thou shall not put any into thy vessel . . . standing corn of thy neighbour, when thou mayest pluck the ears with thine hand, but thou shalt not move a sickle into thy neighbour's standing corn.' (Deut. xxiii, 24, 25.)

garded the prohibition, stuffed their bags full of corn and straw and hurried off.

The better to study the Arab agriculture I went into Transjordan. On our way we called on Abu Hama—'Father of the Wind'—a former successful bandit who with the advent of the British decided that it would be safer and probably equally lucrative to keep an inn for tourists on the road to Jericho; he was in distress because he had just lost his fourth wife and it would take a fortnight to get another. Then on to the Allenby bridge over the Jordan where at the frontier we were kept waiting while an English lady, one of that sturdy middle-aged type that one so often finds in out-of-the-way places travelling alone, but completely able to look after themselves, finished her vigorous denunciation of the passport official who had called out to his colleague that she was 'American', greatly to her annoyance. Our driver was very nervous of brigands about whose activities after sunset many stories were told, but his confidence returned when we picked up a soldier and put him conspicuously in front. We reach Amman without incident and I stayed with the British Resident.

The Emir Abdullah was then ruling and he asked to see me. My host took me to the Palace, a modern building made in two identical halves, one for each of his two wives. He met us in the hall and preceded us into his room. He was stoutish, dignified, not tall, with closely cut beard, blackened eye-lashes and bright dilated pupils giving the appearance of large eyes. He wore a long brown silk robe with gold embroidery round the neck and front, and a gold- (or gilt-) handled dagger with a nasty looking curve in his belt; he had on the headdress which he had popularized: white, ornamented with red squares and kept in place by two coils of black rope. He welcomed me to Transjordan saying that as soon as he heard I was in the country he hoped I would come to see him and that I would stay so as to advise him about agricultural developments; I regretted (quite sincerely) that I could not do that. He said his people still maintained the ancient practices of hundreds of years ago, and would not plough deeply; some of the plains were suitable for mechanized cultivation and this was beginning with promising results. He spoke of a strange 'butterfly' which kills crops even if it simply approaches them,

while if it alights on the ground and stays there it renders the soil sterile for three years. While we were talking a big black servant brought us cigarettes and Bedouin coffee richly spiced; finally he handed us snuff which, however, we gracefully declined. He was not surprised. With a smile he said he had offered some to Mr Winston Churchill who had also come to see him and who found it very potent. 'When I was in London,' the Emir continued, 'I called on Mr Churchill and again offered him snuff. This time he refused it saying he had only just got over an operation for appendicitis. So I asked him: which would you sooner have: appendicitis or my snuff? and he replied, "appendicitis".' Whereat the Emir laughed heartily. He preferred the old days of leisurely horse travel when one could see 'the colours of the earth and the flowers' and even now took his coffee appliances with him and stopped when he felt disposed to have some made. But he was introducing western methods: he used a motor car, was having the palace lighted by electricity and the furniture had come from Tottenham Court Road: it horrified my hostess.

Returning to Jerusalem I stayed at a pension run by a small group of Americans who, fearing the end of the world approaching, came to Jerusalem as the safest place in which to await the event. Meanwhile they set up a pension, starting each day with a short service which the guests were invited to attend. The end of the world did not come but they prospered: as one of my English hostesses acidly remarked: 'they came to do good and they did well'.

No city in the world has so rich a variety of races and religious sects wearing their appropriate costumes: I was assured (though I never saw the experiment tried) that a man could walk down David Street dressed in a top hat and a bathing suit without exciting comment: he would simply be regarded as another kind of 'religious'.

I was in at three of the great festivals which happened to fall in the same week: I attended the Easter service of the Eastern Christians at the Church of the Holy Sepulchre; I stayed part of the Passover at the house of one of my Jewish friends; and I visited the Monastery of Nebi Moussa during the great Festival of Moses where I had a talk with the Mufti of Palestine who

at that time seemed quite friendly to the British and was anxious that we should provide trees to be planted around the Monastery, it being in the hot, eroded country on the way to the Dead Sea. The celebrations lasted a week; crowds of Moslems were there, keeping up their frenzied dancing and singing day and night. 'The only one that gets tired,' the Mufti said, 'is myself.' Each pilgrim brought food which was put into huge cauldrons and made into a stew served out to all. Hundreds of pieces of string were tied to the 'tomb' of Moses to remind him of the devout petitioner who had prayed there.¹

Before leaving the country I lectured at the Hebrew University on Mount Scopus: the most beautiful situation I have ever seen for any University. From the open air amphitheatre one looks over the hills of Judea to the fruitful plain of Sharon and the Mediterranean on the west, terraced hills with olives and vines to the east, and beyond them the drier bare and eroded hills and Dead Sea with the green mountains of Moab in the background. Unfortunately it is no longer in the Jewish sector. I also held a conference with the staff of the Experiment Station at Rehovot.

Palestine had been so flooded with experts and advisers that there was nothing new to put into my Report, but I set out the problems in what I considered their order of importance. First came the conservation and proper utilization of the water supply: on this the whole future of agriculture and fruit production depended. I was uneasy about the lack of control on well sinking in the Plain of Sharon and urged the great necessity for systematically organizing utilization of water over the whole country and for making detailed studies of the duty of water under different irrigation conditions. Next came the need to reduce the high cost of production of all farm products: this necessitated continuance and as it became possible an extension of the plant breeding and selection work, and the greater production of fodder crops so as to lower costs in animal husbandry. The aim should be high-quality high-priced products, for the production of which the marked intelligence of the Jewish cultivators gave them special advantages, while the lower priced cereals could be

¹ The Jews do not accept the 'tomb'; 'No man knoweth of his sepulchre unto this day'. (Deut. xxxiv, 6.)

produced by the Arab farmers more cheaply because of their lower costs of operation.

Neither then nor later did I touch on the question whether there could be room for Jews and Arabs in Palestine, because I could see no solution. The problem has indeed proved insoluble wherever there are races of widely different origin, religion and cultural background. The only way out yet visible is still that of Abraham and Lot: to separate and occupy different regions; Palestine, India and South Africa have all had to adopt this method and the best that can be hoped for is that Abraham's advice should be followed: 'Let there be no strife. I pray thee between thee and me for we be brethren'. We are trying by co-operation to build up a multi-racial community in Kenya, and in the Central African Federation: it will be a tremendous achievement if we can succeed.

I continued to keep in touch with agricultural developments after the mandate was given up and Israel became independent and when troubles in Europe began we were able to take some of the refugees into our laboratories. For a refugee course I had helped to arrange I was gratified to receive an official intimation that 100 trees had been planted in Israel in my name. As I wrote these lines a box of Jaffa oranges arrived from a migrant whom, twenty years earlier, it had been my privilege to help.

CHAPTER XIV

Farmers of the Southern Hemisphere Oceania and South Africa. East Africa

IN 1928 I was invited by the Australian Government and Universities to go there and deliver certain lectures, visit the larger development schemes and discuss with their experts the problems involved. I gladly accepted the invitation and went direct from Palestine. At Perth, in Western Australia, I had my first experience of the welcome I was to receive in each of the States: an Official Reception by the Mayor and Councillors at the City Hall; another at Parliament House by the Deputy Premier (the Premier being away); and a lunch with the Governor, Sir William Campion, who also presided at my first public lecture. I greatly enjoyed the friendliness of the Weld Club but I wanted to be out on the farms and the sheep stations, and it was there that most of my time was spent.

Western Australia is the newest of the States, and several of my hosts had themselves made their farms out of the wild bush, having found a site where water was available. Water supply is the dominating factor in Australian life. Most of the coastal belt has good rainfall, but going inland the rainfall is successively less and less, and the central region, about a third of the whole Continent, is mainly desert. My journeyings were a series of zigzags from the moist well-wooded coastal belt, through the drier park-like savannah, then the still drier bush or Mallee country to the grass belt, and finally the sage bush belt that fringed the desert. In this way I travelled round the southern and eastern part of the Continent where most of the people live.

It was May, winter (though very like a good summer at home), and the season when rain was due: if enough fell the farmers would prosper; if not, they would fare badly. The moist coastal belt was farmed much as in our west country, producing

apples, dairy produce, meat and the various farm crops; there were however some obscure soil deficiencies not yet diagnosed. The inner belts differed from anything I had seen before either in Canada or the States. The untouched park-like savannah is very attractive, the tall graceful Eucalyptus with their greyish green leaves often housing flocks of brightly coloured but destructive green parrots. But the farmland was dreadfully untidy. Trees had been ring barked, then left to die, and remained as gaunt leafless spectres till they dropped and mouldered away or were burned. In the drier mallee country the trees were smaller and of stooiling habit; they and the rest of the bush had been broken down by heavy rollers and burned. As in Canada, wheat was the important crop, alternating with fallow, and, as in Canada, the shortage of man-power was met by the invention of suitable machinery, one type of which, the stump-jump type, greatly intrigued me: I never tired of seeing the ploughs hop over tree roots. Later I tried one at Rothamsted when we reclaimed some woodland but there it was less happy.

There were striking differences from Canada. Owing to the warmer conditions Merino sheep do well; by a stroke of genius John Macarthur had introduced them in 1797; they have become the basis of Australia's wealth, yet oddly enough I saw no memorial to him nor any place named after him. They were invariably kept on the wheat farms. Superphosphate has a remarkable effect in increasing the wheat yield: this was discovered by John D. Custance at the Roseworthy Experimental Farm in the 1880s but by one of those ironies that seem to beset Australia's benefactors his work was ignored and no one knew what had become of him; the discovery was widely attributed to his successor, William Lowry. As in Canada the wheat farms are large and run by one man: 600-1,000 acres was a common size of which 200-300 would be in wheat, the rest being fallow and stubble grazed by 200-300 sheep. The farmer and one man formed the entire permanent staff. The typical farmhouse was small and single storeyed with a veranda and a corrugated iron roof which looked unsightly but kept the house cool at night and its gutters carried the rain water into a large tank. We commonly drank tea seven times a day and ate mutton three times; this meant killing a sheep every few days because there were no

refrigerators and in the hot weather meat would not keep long: in any case the Merino is a scraggy animal. Our talk was chiefly of the rain (How many points¹ have you had? was a common telephone call); of the chances of the Melbourne Cup; the iniquities of the Labour Party, the agitators and the Government which had fixed tariffs that made farm appliances very costly while the farm produce had to be sold at world prices; the unsympathetic attitude of the Arbitration Courts which fixed farm wages at levels that had no relation to the value of the output: this last difficulty I heard later was being evaded by getting work like shearing done on contract and by taking on the men not as paid workers but as 'share croppers', virtually *metayage*. The farmers considered they had lost by Federation, as political power had now passed to the more heavily populated industrial and commercial cities of the east.

The wheat belt had been steadily widened by the success of the plant breeders in producing new varieties more tolerant of dry conditions: the limit had formerly been the line of 16 inch rainfall but was now pushed out to the 12 inch line; if the rain was suitably distributed about 20 bushels per acre could be obtained. Unfortunately these low rainfalls are very erratic; even over a short period the range had been from 4 inches to 19 inches a year: from drought to flood, and there were the added risks that a hail storm might devastate the ripening corn, and in the east, where there are more people, that fire might destroy everything. Chance plays a dominating part in the life of an Australian farmer or stockman, and I easily saw why horse racing and poker have become his favourite pastimes.

While in Western Australia I wanted to visit the settlement of unemployed and others from Britain. Some 30,000 acres had been converted into small farms and generous help was given to enable the men to become established: Dorothy, one of the Renshaw Street Mission girls, and her husband were there; unfortunately I could not then manage to get there.

I entered South Australia in the low rainfall sheep-grazing belt and stayed at the beautiful house of Sir John Melrose at Ulooloo: in the evening we might have been in a good English country house as we sat and talked after a choice dinner and

¹ A point is 0.01 inches.

some excellent wine, the men faultlessly dressed in dinner jacket suits and the women in attractive evening frocks. The station had 15,000 acres and 7,000 Merino sheep, i.e. one sheep to two acres: further inland towards the salt bush waste the rate falls to one sheep per five or more acres; while towards the coast in the moister lucerne districts it is five sheep to one acre. Here I heard of the strenuous life of the shearers, independent gangs of men who work on contract, shearing eighty to one hundred sheep per day at £2 10s. per hundred:¹ but not uncommonly at the end a man would turn into an hotel, gives his cheque to the proprietor and ask to be supplied with liquor for as many days as the money lasted and then to be turned out. Possibly this bout of hard drinking is a physiological necessity after a long period of very hot trying work.

The farther inland one goes the larger become the sheep stations. The largest I heard of was in Western Australia, it covered a million acres; from the entrance gates to the house was a drive of fifty miles. It carried 25,000 sheep and was run by the owner, his two sons and eight 'musterers'. On the remote stations life was often very lonely, and I heard of men going 'bush queer' in consequence. Already, however, there was some mitigation, which afterwards greatly extended, by the increasing use of cars, the telephone, wireless, and the pedal transmitters whereby help could be summoned; in case of need a doctor could come out by airplane chartered at taxicab rates. Some people remembered when the stations had to be pretty well self-sufficing. I met an old lady who had had to make her own soap from mutton fat and alkali.

At Adelaide as at Perth I had both a Government and a University Reception. I was particularly interested in lecturing at the University where several of our distinguished scientists had spent some very fruitful years: among them William Bragg, Charles Martin and Douglas Macdonald. Also it was refreshing to see that sure sign of ease and leisure: a good bookshop, Preece's, said to be the best in Australia; and to visit the famous Waite Institute where A. E. V. Richardson and afterwards J. A. Prescott

¹ The highest performance I heard of was the shearing of 8,000 sheep by 6 shearers in 6 days: an average of 220 per day. On an English farm a usual number is 16 to 20 per man per day: the comparison, however, is not altogether simple.

of Rothamsted and their colleagues have done such fruitful work. I was invited to some of the delightful country houses in the hills: homes that carried the stamp of years of settled prosperity. As elsewhere in Australia I was struck by the sense of permanence; there was little of the restlessness I had seen on the prairies. In the vine district I visited Mr Oscar Seppelt, the third generation of vigneron: a number of the growers were Germans who while retaining their language and way of life had been thoroughly loyal throughout all the years till Nazi propaganda had corrupted some of the young men and they had to be interned in the 1939 war.

I made a pilgrimage to Mount Barker where in 1888 a local farmer, A. W. Howard, had discovered subterranean clover which had somehow got there from the Mediterranean and which has since brought great wealth to Australia. We found him dressed in slacks working on his land like a labourer; his discovery had neither enriched him nor disgruntled him.

Then I went to Melbourne where in addition to the official receptions I had the great pleasure of an invitation from Madame Melba—Dame Nellie as she was invariably and affectionately called—to go to her home and have tea with her: and with her permission I took also one of our Rothamsted workers, Mary Glynne, who was spending a year's study leave at the University. In spite of some sceptics Dame Nellie was very hopeful of raising the standard of musical appreciation in Melbourne. She had brought over some good Continental musicians and she invited me to go with her to the Opera one evening to see how far they had got; unfortunately all my evenings were filled. Another whom I was delighted to meet was Sir George Julius, the engineer who invented the 'tote'. Lively and ingenious-minded, he was not at all 'horsey' and was indeed the son of a bishop; the tote had been for him simply an interesting development of the calculating machine.

Apart from its attractiveness and its distinguished University and research organizations Melbourne is for an agriculturist one of the best centres in Australia because of the remarkable variety of farming types accessible from there: comfortable coastal farming, enormous sheep stations, great irrigation schemes, the island farming of Tasmania and others.

My guide to the irrigation scheme was Professor S. M. Wadham¹ of Christ's College, Cambridge, whose important studies of land utilization in Australia were gaining a wide reputation for him. The Premier kindly lent us a Vauxhall car and we went off to the Goulburn and Murray irrigation systems, which have the special interest of being by far the largest worked entirely by white labour in the Empire. These have entirely transformed the region: instead of the earlier sheep stations of 30,000 to 40,000 acres there are now closely settled communities of small growers producing citrus fruits, grapes, prunes, and canning fruits on the well watered holdings, and lucerne and irrigated pasture for dairy and other livestock products where less water is available. The problems seemed to arise mainly from the circumstance that many of the growers were new to the job, being returned soldiers after the 1914-18 war, but they were settling down reasonably well, and the Advisory service and the local Research Station were doing good work. I had already met most of the technical problems and difficulties in Utah and California and I discussed them with the local staff in the light of what I had learned there. They included management of soil and of water, and possible methods of making the underlying clay band pervious to water, so as to facilitate drainage. There were also the perennial variety and fertilizer problems. In view of the considerable variations of soil and of plants I emphasized the need for proper statistical control of the design of the experiments and of the deductions drawn from them.

Various little towns had grown up as centres of supply and of sociability for the growers; usually each consisted of a rectangular block of shops and other buildings and each had several hotels. These we found quite good: the beds were clean and comfortable though the bath water might be turbid; breakfast was usually mutton cutlets or beefsteak and eggs; at lunch and at dinner turkey and apple tart was a favourite combination. The bar was the social centre; the licensing laws were not always observed to the point of inconvenience, and I remember a 'shearer', resting after his labours, trying to count our little group as we were preparing for dinner after a hot and tiring day, hoping that we should invite him to join in a 'shout'—a

¹ Now Sir S. M. Wadham

procedure in which each member of the group calls in turn for drinks all round—but he failed to make our number the same twice running. The labour problem was difficult, however; meals were served only at definite and rather restricted hours, but there was usually a restaurant in the block kept by a 'Dago' where good meals could be obtained at any time. Some of the hotels had a special feature: one kept a couple of kangaroos which boxed each other to the perpetual delight of the patrons. There was of course a school, and not uncommonly three or four churches, the Catholic Church being often rather imposing; also a cinema or two showing American films.

I greatly deplored the absence of British films which was all the more regrettable because of the great affection for Britain that was manifest everywhere: when the young people talked of 'going home next year' it was Britain they meant. Life was chatty and sociable; opportunities for functions were readily taken, indeed at one progressive little town where no Civic Reception for me had been organized a reproachful leader on the subject appeared in the local paper. But I could not help wishing for something like our County Library and Drama League to give some really good leisure occupation: 'an intellectual graveyard' was the description given me of the bush stations. Perhaps by now the position is better.

From Mildura and Renmark we visited the irrigated districts around Griffith, then struck into the region of large sheep stations and on to Bendigo, once a wealthy gold mining centre but now a pleasant residential town; its chief feature was a clock that struck the hours, then a rarity in Australia; it was related that Madame Melba had had it stopped during her visit because she could not tolerate it. Then on to Bathurst, an old convict town still retaining the good stone buildings and stone bridges built by the convicts. They had certainly been used to good purpose and many tales were told of them and of how a shortage of skilled workers could often be remedied by a request to the Home Authorities who apparently could always supply suitable desirable criminals. At one of the convict-built houses where I stayed my hostess told me that they were supposed to carry some blight of sadness—but hastened to add that hers did not.

Sydney puzzled me: there was so much I was not used to. Its

skyscrapers gave it an American look and when I asked to see the famous cricket ground I was shocked to see people playing football there. My *début* at the University was disconcerting. At the Staff luncheon I was invited to give an address and I took the opportunity of emphasizing the need for a strong Arts side to balance the technological and scientific sides which necessarily had to be developed; I vigorously denounced the dictum of one of the science professors: 'There is no more culture in the classics than there is in an old top-hat.' Unfortunately the waitresses made such a clatter in clearing away and washing up—which they did in the dining room—that speaking was painful and remonstrances by a member of the Staff were in vain. 'Labour rules' I was told ruefully; and discourtesy and inconsiderateness seemed to be among its characteristics.

The Premier, Mr Bruce (now Lord Bruce), invited me to meet him to discuss agricultural problems, and I had a number of talks with Sir David Rivett who has so successfully fostered the use of science for the advancement of the Commonwealth.

Then I went on to Queensland and was so pleased with its Agricultural College that later on I sent my son Derek there, he having expressed a wish to farm in Australia. I wanted especially to see the work on pasture improvement by sowing better grasses, the very useful *Phalaris tuberosa* (Canary grass) had been found growing on a waste heap at Toowoomba and no one knew how it got there.

Before leaving Australia I visited Tasmania. I felt that if it was tidied up it would be a most attractive island, where life could flow very smoothly among its friendly people. But there were no obvious fortunes to be made and some of its younger people were feeling that Western Australia offered better prospects. More could have been done, however: hay was being exported to the mainland which might have been converted into more valuable meat and dairy products; virus diseases were wrecking potato crops which might have been valuable exports.

But travel was easy and always had something of interest. One lunch that we found quite casually consisted of oyster soup, wallaby (which tasted like venison with hare flavour), fowl, and apple pie. On one reclamation scheme trouble had arisen because a platypus would block up a main drain pipe. I was invited by an

enterprising schoolmaster, Mr J. S. Maslin, to visit his school and was gratified to learn that he had used my *Lessons in Soil*: I planted two trees to commemorate the visit—years afterwards they still survived.

I had had a busy time lecturing and visiting farms and on the Sunday my guide, Mr Ward (the Director of Agriculture), and I decided to have a day's walk along the cliffs which promised to be very enjoyable. Soon after starting we met two attractive children and I had a little chat with them: we continued our walk but very soon a man came chasing after us on horseback: 'Aren't you Sir John Russell?' he asked. 'You 'ave been talking to my children and I recognized you from their description. Won't you come round my farm? I will get some of my neighbours in.' The invitation was so obviously sincere that we abandoned our walk and got another day of 'shop' after all! On another occasion after a tiring day I had settled down in a comfortable little hotel to a quiet evening with two or three pleasing companions when a telephone call came through: a group of farmers had assembled at a place about ten miles off to hear a lecture but unfortunately at the last moment the lecturer had fallen ill: would I go and talk to them? I did; it was a cold journey but I was rewarded with a fine display of the southern aurora, and at the lecture met a very interesting group of farmers including some old timers: hard bitten, unkempt and unshorn, but great characters; men who had gone out and changed the waste into good farmland.

From Australia I went to New Zealand by the slow little Maheno and thoroughly enjoyed the four quiet days at sea. There were very few passengers; the most entertaining was a Hollywood film actress taking a long holiday. She was certain British films could never be very successful: British girls lacked 'it', without which apparently films are doomed to failure. At Auckland I had a most cordial welcome from the officers of the Department. In the North Island I was taken by a distinguished old student, Dr H. E. Annett, through the Waikato dairying district and was amazed at the industry of the farmers and their skilful management of the grassland. One man and a 'boy' (the word has no reference to age but simply means a paid hand) were running a hundred acre farm carrying fifty-five to sixty

cows in milk. For the late comers the financial rewards were not very high: they had paid up to £60 per acre for their farms; the price paid for butter fat, their chief cash product, was about 1s. 9d. per lb., and they might expect 200 lb. per acre: much writing down of capital would be necessary. The high output per man was possible only because the climate is almost perfect for the growth of grass and the cows can be out for almost all the year: there is therefore little need for cleaning of sheds and carrying of food. Labour was becoming scarcer but mechanization was facilitated by the abundance of water power which allowed of ample supplies of electricity. Fertilizer (chiefly phosphate) was applied to the grazing lands by aeroplanes.

The chief plants were clover and rye grass, both from England; both had developed very productive ecotypes, a remarkable characteristic of the North Island conditions. The grass was left down indefinitely: many farmers had no ploughs. Other parts of the North Island are less productive and I was very interested in the puny soils of the volcanic Rotorua region, on which cattle would not thrive. The anaemic look of the grass and animals suggested a shortage of iron; this was supplied as ferrous sulphate and proved effective. But an agricultural problem is rarely solved completely at one step: later work showed that the real deficiency was cobalt, and the ferrous sulphate had acted only because it contained cobalt as an impurity. Other trace elements were lacking, but when these were supplied the ordinary agricultural treatments produced useful farmland.

The South Island is very different in character. At Nelson I gave the Cawthron lecture¹; it ended, like my others, with the singing of the National Anthem. I visited the school which Rutherford had attended, and I spent some very pleasant hours in the sunny hills of that delectable region, one of the choicest I have yet found. A scenic preserve has very rightly been established in Marlborough County: the Kiwi still survives but the Moa, the gigantic running bird, is unfortunately extinct.

Farther south I saw another of the agricultural wonders of New Zealand: Banks Peninsula, near Christchurch, where Ebenezer Hay had settled in 1843, and nearly twenty years later, in

¹ Twenty-seven years later (1955) my son Walter gave the Cawthron lecture: this is, I am told, the only instance when father and son have both delivered it.

1861, received from Edinburgh the 2 lb. of cocksfoot seed which was to become historical: half he gave away but half he sowed himself. It yielded a 'magnificent crop of seed which was so much in demand that he cleared more and more land by firing it—the settlers' usual device: there being no competing vegetation the cocksfoot remained pure and has so continued to this day; it is now famous throughout the world. Other plants introduced from this country had fopped away in similar style and become great pests; ragwort, gorse and bramble in particular have taxed the ingenuity of farmers and 'scientists' alike.

While at the Lincoln College in the Canterbury Plain I saw the famous fat lamb production on the ley system which has since become popular in England. The farms are larger than in the North Island, being about 300 or 400 acres and commonly worked by four men; the output per man is very high. Unfortunately a severe cold prevented me from visiting Dunedin which claims to be more Scotch than Aberdeen: instead I went into the New Zealand Alps to recuperate at Arthur's Pass.

The efficiency of the New Zealand farmers extends also to their marketing. Their co-operative systems gave the producer some 75 to 80 per cent of what the British housewife was paying, instead of the 50 per cent which was the British farmers' usual share.

New Zealand is one of the most interesting countries I have ever visited. Its agriculture is unusually instructive while for the ecologist it is a veritable paradise. Within a relatively short distance and accessible without any difficulties or travel discomforts lie the vast range of vegetation conditions from almost sub-tropical in the northern end of the North Island to the cold of the far south, and from high rainfall to semi-arid. Years ago Dr Cockayne made some remarkable studies of the modification of growth forms resulting from these wide differences. Important studies of various grasses have since been made by E. Bruce Levy and others. These and many other investigations have opened up a prodigious number of fascinating problems in applied biology and agricultural science, which if I had been starting again I should much like to have tackled.

New Zealand is fortunate in having no disturbing population problems; 95 per cent of the population are of British parentage; the remainder are the much earlier immigrants, the Maoris;

there is no foreign element. The Maoris have their own culture and, unlike the native Australians, the power of survival in contact with the whites: their numbers indeed are increasing. They are mostly in the North Island and if they contribute little to its wealth they at least add to its interest, for they are pleasant chatty people, fond of dancing and singing, with a great command of their rich and musical language; some indeed can be eloquent in English. Life comes easily to them: I remember a village built round a little group of hot springs, one of which did the cooking, another the laundry and a third served as a common bath ('mixed bathing', a village woman told me, 'there is no false modesty about us'). The houses consisted simply of four walls and a roof covering the bare earth. The Maoris never allowed themselves to be worried with business cares and did not pay bills if they could help it. Most of them are long headed and thin nosed and one sees some good faces: some of the girls are attractive with their swarthy complexions not yet tattooed. A little intermarriage had occurred with the whites, and physically the results did not seem unsatisfactory, but the practice was not encouraged.

I was invited to attend the opening of a chief's house, a community hall, in one of the villages: it was built in the usual Maori style with some elaborate wood carving on the front and decorated mats on its walls. The dancing party came out to meet the guests, bearing the stone axe or club and giving the challenge. Then came a speech in Maori followed by a dance by the older men and women with tattooed faces carrying short clubs or axes and rushing up to the spectators from time to time, making horrible grimaces and threatening gestures to show their prowess. Then came the 'Poy' dance by girls wearing short skirts made of reeds, and each one carrying two small balls tied together with string with which they made much play. There was no vigorous movement but it was all rather graceful; the reed skirts contributed greatly to the effect.

The dances being over I was introduced to the chief, Mita Taipopoki Rewite; he spoke no English but we had a good interpreter. We rubbed noses according to custom; his was very hard and none too clean. He then said in Maori: 'So you are from England. the home of our great protectors.' We conversed in

this strain for a short time and then he broke out into the only English he had used: 'Goodbye, see yer termorrer.' Finally came the Maori farewell: 'We look to our King, who is in England.' I was afterwards presented with a carved walking stick in memory of my visit.

Before leaving New Zealand I was received by the Prime Minister, The Rt Hon J. G. Coates, and afterwards discussed problems with members of Parliament and of the Universities and with agricultural officials.

I came home via the Panama Canal. On the way we spent a couple of hours at Pitcairn Island, but were not allowed to land: instead the islanders came on board to us and I was able to see what the descendants of the mutineers of the *Bounty* and their native wives looked like. I got some of them to sign their names in my book; two were called Christian, one was a Young, another was a Warren. They had swarthy, gipsy-like complexions, spoke English quite nicely, had some sense of humour—one of them signed herself as living in Piccadilly, Pitcairn. We gave them flour and clothes, these being two of their chief shortages, also we bought from them little boxes, walking sticks, etc., made by the men, and some baskets made by the women. They did some farming, much of it communal; they kept goats for milk and occasionally killed one for food; they used coconut milk for themselves and their children, and they caught fish. All these things, however, were done only when they were hungry or thirsty: they had no regular meal times and thought it rather funny that we should be tied in this way. They are very fond of their island although it is by no means very fertile, and they lead a singularly care-free life. They have had missionaries and are Seventh Day Adventists. As we left they stood by in their boat and sang 'There's a land that is fairer than day' in a minor key with many parts and, coming over the water, it was pleasingly effective.

A few days later, and having seen no ship since we left Wellington, we received a wireless message out of the blue from a tanker asking if we had a doctor on board, as they had a sick man. They described his symptoms and our ship's doctor and one of the passengers, J. S. Elliott, a highly skilled surgeon,

diagnosed the trouble as appendicitis and gave the man only a few days to live. Instructions for temporary treatment were wirelessly, and both ships altered course so as to meet at a certain point. I was up at 6.30 a.m. and saw the tanker as a speck on the horizon. We met, put our doctors on board; they did the operation—with some difficulty, having little catgut; they left dressings and full instructions, and then both ships departed on their separate ways. We kept in touch for two or three days till we got out of range, and when we reached Panama we received a cable from a hospital in South America stating that the man had been put in there and was doing so well that his recovery seemed certain.

We reached Southampton on September 22nd, having been thirty-six days on the journey of 11,290 miles. This is the shortest sea route to New Zealand, though for the aeroplane the shortest of all routes is over the North Pole.

I was back in Australia ten years later: in December 1938, in the midst of a very hot and dry summer. Air travel had developed remarkably; and I saved much time thereby. The years of financial crisis had hit the farmers badly and their aim was no longer to increase output but to reduce costs of production. They were doing this as ours had done, by increased mechanization: I heard of a 20-disc plough drawn by a Diesel tractor ploughing a 10 ft. 6 in. width at a fuel cost of 3d. per acre. The rate of staffing on the wheat farms was still one man per 500 acres but no longer was the wheat belt being pushed farther into the lower rainfall zone: there had indeed been a withdrawal, and some of the marginal wheat land had now reverted to permanent grazing for sheep. The rainfall was so uncertain that the wheat might fail for two or three years running, and then when a good crop came prices might be low.

On the small family farms of the coastal belt life as before was very strenuous. I talked to the son of one of the Hunter Valley farmers: he rose each day at 4 a.m., milked and tended seventeen cows, then proceeded to spray-irrigate the lucerne, their most valuable crop; this and other field work kept him busy all day, then came the evening milking. He wanted to get out of it and become a chauffeur.

In Western Australia I visited one of the group settlements for the British unemployed ex-Servicemen and their wives that I had missed in 1928; I was especially interested because it had been rather on the lines that I had contemplated in 1900. It had failed, and for the same reasons as mine would have done: for lack of grit and of agricultural knowledge, to which had been added the financial crisis. It was a pitiful sight: the 100 acre holdings, set up at a cost of £3,000 to £4,000 each, had become poor grazing land, the houses were tumbling down; the last valuation had been £750. Most of the men had simply walked out. Some—Dorothy's husband among them—had got other work but a number did nothing and clamoured to be sent home, which they were; some even threatened legal proceedings, alleging that they had been induced to come out on false pretences. The Western Australian Government had lost a lot of money on the settlers and feeling was bitter against them.

The most interesting scientific development had been the discovery of the cause of the soil troubles pointed out on my earlier visit: it was a lack of the trace elements zinc, copper, molybdenum, boron and manganese for plants, and of cobalt for animals. Remarkable work had been done on the subject at the Waite Institute and by H. R. Marston and his team at Adelaide, as a result of which the productivity of many thousands of acres was being considerably increased: this is one of the most striking of the modern examples of the beneficent uses of science. Much quiet but valuable work was being done on pasture improvement under the Commonwealth Scientific and Industrial Research Organization, the very able Chairman of which was Sir Ian Clunies-Ross.

I visited some notable sheep stations in the east. The most memorable was that of Sir Frederick McMaster at Dalkeith, New South Wales: it covered 36,000 acres, 2,000 being under lucerne; it carried 26,000 Merino sheep including a valuable stud flock and several thousand cattle. The permanent staff was twenty-two but there were thirty temporary workers; for the cultivated section about one man sufficed per 500 acres. His father had bought the station in 1890 from the Scotsman who started it but whose men forsook him when the goldfields opened up. Sir Frederick and his Lady had made a beautiful

home, well appointed, with a good library, its own open air swimming bath, landing ground, wireless transmission set and cinema. Lady McMaster had assembled a delightful house party and after dinner we saw the film *Pygmalion*, which Sir Frederick had borrowed while on its way to Sydney for its first showing in Australia. His son Ian¹ had collected me from another station eighty miles away: I got my first hint of the scale of entertainment when I saw in the car a sack of oysters, said to be one cwt., which we were expected to consume. It was quite a business opening them.

In these old settled stations there were many memories of the natives. One lady who had been on her station for fifty-five years told me that there were a number of them in her early days: they were good cattlemen, rode well, were reliable and faithful. They were very fond of mimicking white people though they never mimicked her because they liked her and respected her, as head of the district. But the white man's diseases (and vices) had killed them out; the wearing of shirts also had been detrimental. In my journeys I had seen natives only on the Nullarbor Plain: they were dirty and degenerate; it was difficult to see any future for them. I often wondered how they lived before the coming of the white man, for Australia had neither native food grains, cattle, nor sheep: I learned that their food had been kangaroo, wallaby, snakes, goanna, birds' eggs, birds, grass seed and pine kernels. They were at first turbulent but gradually quietened down.

I went into North Queensland to see the sugar cane grown entirely by white people. The Italians were notably successful; a little band would work together at sugar cane cutting or other lucrative employment, live frugally, pool their savings, buy a farm, and draw lots to decide who should have it. The others continued as before, and the fortunate member bought himself out of the Pool as soon as he could. When sufficient funds accumulated a second farm was bought, and lots again cast. So the process went on till all were settled. I met also some good Yugoslav settlers. It will be extremely interesting to see how far Europeans, especially British and other Western Europeans, can settle in a hot climate. So far it appears that adults can safely do so if

¹ Unfortunately killed in the war.

they take proper precautions, but children have to be sent south to school. The question is important because this northern part of Australia, while not good for sheep, can produce beef: I visited Tully where this was being done: I also visited farms on the Atherton Tableland. Tropical Australia claims that it is practically free from the usual diseases though both typhus and typhoid were about and the water was not safe for drinking. But there seemed considerable possibilities of development.

My official reason for coming to Australia had been to attend the meetings of the Australian Association for the Advancement of Science at Canberra. The little group invited from Britain consisted of F. T. Brooks the Cambridge botanist, Sir John Flett the geologist, N. V. Sidgwick the Oxford chemist, H. G. Wells and myself, and we were invited by the Governor-General, Lord Gowrie and his Lady, to stay at Government House, Yarralumla. A most delightful party had been assembled and I immensely enjoyed my time there. Wells was in great form and some of his sayings had preceded him: a ripple of laughter had gone round the country when it was learned that on the way out he had mildly remonstrated with the ship's barber for interrupting his hair-cut to serve some other customer: 'Do you realize,' he said, 'that every time you leave me my hair grows a little longer?' On landing he had been seized upon by reporters and had described Hitler as a mentally deranged man who would be certified as a lunatic in England; most people agreed, but the Government, fearing an official protest, had thought it proper to disclaim liability: after all we were still nominally at peace with Germany and legations are touchy on such matters. One evening at dinner the conversation turned on people saying more than they meant, and Lord Gowrie with a twinkle asked Wells whether he ever did this: he replied that this depended on circumstances, such as, for instance, the alcohol content of his blood. I put in that this explained why he was sometimes the naughty boy of the party, to which the Governor added he was sure that Wells would be a good boy, at least till the Conference ended.

The scientific meetings were most stimulating and went without a hitch, thanks to the efficiency of the organizing Secretary, Miss Margaret Walkom, acting for her father who was unwell.

It was midsummer: the temperatures were very high and bush

fires—usually caused by careless travellers—were raging. On a journey to see the Burrinjuk Dam we were nearly caught in one: it was the other side of the river and we watched it from the high ground on our side. The hot strong wind had dried and warmed all the vegetation making it highly inflammable. Sparks were blown high in the air, starting little fires wherever they fell: small puffs of smoke appeared, flames burst out and spread. The trees caught fire at the top and burnt downwards with sickening slowness as if there was no hurry for them. The usual fire breaks were useless; the sparks were being carried a quarter of a mile or more, there was nothing for it but to get away as quickly as possible. The whole atmosphere was heavy with smoke and the sun was blood-red in a cloudless sky; then suddenly the air would clear and the sun burst out in its full heat, the brilliant glare making the grass in the distance look like snow. Our friends at Canberra had sent a police ambulance out for us but fortunately it was not necessary. But it made me realize how terribly cruel Australia can be.

I had wanted to call on a friend who had married and settled down on a farm but it was burned out and she and her husband had saved their lives only by immersing themselves in the pond. Her father-in-law had been a great figure in the local politics, and apt at warding off troublesome hecklers. At one meeting a disgruntled lady had shouted at him: 'If you was my husband I'd poison yer': he looked at her for a few moments and replied quietly: 'I'd take it'.

I heard many stories of the back country in the old days, not usually very elegant. A hotel keeper came to die, but no coffin was available so he was buried in his pyjamas. When the funeral party returned to the hotel it was discovered that the drinks were locked up and the key was nowhere to be found. Then someone remembered that the deceased always took it to bed with him in his pyjama pocket: it must therefore have been buried. So the party exhumed the body, collected the key, and returned to celebrate.

It was a pious duty to make a pilgrimage to Lambrigg, the home of W. J. Farrar, who, educated at Christ's Hospital and Pembroke College, Cambridge, and threatened with tuberculosis, came out here in 1870 as tutor; in due course he married

the daughter of this estate, and settled down to improve Australian wheats, a task no one had previously attempted. He set up a little laboratory in the field and laid out some experimental plots. He was very ingenious in overcoming difficulties: he could not then buy forceps in Australia so made a pair from a hair-pin. He lies buried on top of a nearby hill which commands a magnificent view of beautiful rolling country traversed by the Murrumbidgee. His wheats were very successful, and enabled wheat culture to be pushed well beyond the original limits; he laid the foundation on which later generations have worked. The Minister unveiled a memorial to him, but he needed none.

I left Australia with great faith in its possibilities. The most serious physical difficulty is the drought; it is being met by the constant search for more effective methods of soil and crop management, for more drought resistant varieties of cereals and fodder plants, especially grasses, better methods of fodder conservation, and by engineering devices for making the best use of available water. I was several times pressed for a forecast of the possible expansion of agricultural production but always refused to make one. Sir William Crookes in 1896 had dismissed the possibilities of wheat production as being simply 'a fruitful field for speculation', yet within forty years Australia had become the third largest exporter in the world and production had risen so high that it had to be curtailed. Any forecast made now might equally be falsified by some new scientific or technological advance.

There are, however, human problems for which solutions are needed. The present small population—some 8 millions only—is a potential source of danger though the firm resolve to reserve the country entirely for people of British or European origin is thoroughly sound. The very small numbers of men employed per thousand acres of agricultural and pastoral land mean that the population is preponderantly urban and industrial, and as not infrequently happens in such conditions elsewhere, agricultural problems are not understood and laws of economics are disregarded. Mr Menzies expressed the position tersely: 'The fault of the Government is attempting too much too quickly, and of Labour is doing too little too slowly.' There was said to be considerable Communist activity in the Trade Unions with the

purpose of hampering industry and commerce, and some of the restrictions and strikes could not easily be otherwise explained. But there is a great fund of common sense and loyalty in the average Australian and it is unlikely that hostility of this kind will long be tolerated.

SOUTH AFRICA

In 1929 the British Association for the Advancement of Science was invited to hold its meeting in South Africa and Elnor and I were among the guests. Thanks to the help of some old Rothamsted men who were doing useful work out there we were able to see a great deal of the country and of its farming problems. As in Australia, water supply, phosphate deficiency, and pasture improvement are especially important problems, but there are two others more acute in South Africa than elsewhere: livestock diseases and some apparently insoluble population difficulties.

The rainfall pattern is somewhat like that of Australia and the general soil utilization follows somewhat similar lines except that maize takes the place of wheat. Sheep are the chief farm animals; they have remained pure Merino which gives their wool higher value than that of Australia where some crossing has occurred. Much fruit is grown in some of the valleys in the south of Cape Province. Many of the growers were British and some of them obtained very high quality produce. The wine growers were mostly of French origin, Huguenot refugees of the seventeenth century who had been allowed to settle but compelled to abandon their language and use only Afrikaans. Some of their houses built in the old Colonial style were very attractive.

Farther inland the rainfall rapidly decreases and the farms become much larger and are mainly held by Boers. Here conditions are completely different from those in Australia. Instead of a small number of white men using big tractor-drawn machines to cultivate their crops the Boer farmers use a relatively much larger number of black Africans and this means that bullocks are the main source of power, owing to African ill-treatment of both horses and tractors. In 1929 one of the most typical sights on the veld was a Boer farmer driving a bullock waggon

drawn by a span of a dozen oxen. In the High Veld of the east the rainfall is high enough to allow of mixed farming, but over much of the drier country the farming is of the simplest: the veld is burnt in July or August to destroy insects and to give the young grass a chance of breaking out; the animals are then turned out to graze. No fodder crops are grown so there is no provision for food in the dry season except a little hay; some animals are sent east into the higher rainfall country, some are sold, and some remain half starved on the farm. When at the age of ten or thereabout a bullock was past work he was killed and eaten; sheep suffered the same fate when they no longer produced wool, poultry also were old; all were tough. But we found the Boer farmers very hospitable.

Unfortunately South Africa's chief river system, the Orange, is not well suited to irrigation and not much more than 0.5 per cent of the total farmed area (213 million acres) is irrigated: this might be doubled and some optimists think trebled, but little more is in sight. I saw some of the irrigated citrus of the eastern region: some of the best growers were British, having been brought out by the very useful 1812 Memorial Organization. The fruit has the advantage of coming on to our market six months after the Mediterranean harvest and its only competitors are Australia and Brazil.

For South Africa as for Australia and Canada the great agricultural problems centre round the long rainless period when plant growth ceases, and as irrigation is practicable over only a very small area some better storage of the rainfall is essential. I was greatly impressed by the need for much fuller development of soil physics, especially to study the phenomena of crumb formation in soil. A further reason was the prevalence of soil erosion: I had never seen so much. It had not only hollowed out great dongas and led to the drying up of springs and of streams, but it also caused periodical floods and a steady deterioration of the veld. Action had begun but farmers were not as yet much interested: later on more was done and when in 1946 the Soil Conservation Act was passed it was the most comprehensive in the world. J. C. Ross's admirable work contributed largely to this result.

Good work was being done on the improvement of food sup-

plies for the animals. I. B. Pole Evans had made some remarkable explorations in Central Africa in search of promising grasses and his collection at Irene was a delight to see: some of these appealed to farmers and were coming into use.

T. D. Hall and his associates showed me some of their demonstrations of ~~ve~~ improvement by proper use of fertilizers. Unfortunately, however, few farmers were adopting the better methods. Phosphate is vitally important here as in Australia and New Zealand, and this made me regret all the more that the British Empire, so rich in resources in many ways, should be so desperately poor in phosphate. The small Nauru Island supplies Australia and New Zealand at present, but the rest of the Empire depends on French North Africa and the United States for supplies, and we should be in a most serious plight if ever they were withheld. Our experiments at Rothamsted showed, however, that only about 25 per cent of the phosphate applied as fertilizer was taken up by the crop, and it was obviously necessary to find out what was happening to the rest and whether there was any means of recovering it.

In Cape Province we saw some wonderful fruit grown by Miss Kathleen Murray, who had an uncanny gift for producing plums, peaches and other fruit without blemish and getting them to London in perfect condition. One of my old colleagues, A. Appleyard, took us over the Cecil Rhodes Fruit Farms of which he was now manager and where he had achieved remarkable results that greatly pleased me. We also met a promising young politician, Ian Hofmeyr, who had he lived might have become a statesman, but not even the care of his watchful mother saved him from an early death. At Pretoria we were the guests of Mr and Mrs Myles Bourke at their attractive home set in a glorious garden with a wonderful collection of Karroo plants, and there also the University of South Africa did me the honour of conferring upon me the degree of Doctor of Science.

But Arnold Theiler was not there. This great veterinarian, Swiss by birth, had gone out to South Africa in 1895 to investigate the livestock diseases which cause such terrible losses, the result of the almost perfect adaptation of the conditions to insect life. He had achieved brilliant successes, and had brought some of the worst diseases under control for the first time. He had

established and organized the well equipped Veterinary Research Institute at Onderstepoort, by far the best in the Empire. No one had done more for South African farming than he. Unfortunately a wave of Afrikaner nationalist feeling had decided that only Afrikaners should be employed in the agricultural service and he was dropped; the British Government softened the blow by conferring upon him a knighthood of which he was very proud, but when later I had met him and his wife in Australia he was still sad at having had to leave.

And there one has the greatest of all South African problems. The Boers are prolific and are outnumbering the British; they are intensely nationalist and exclusionist, and while very shrewd and able in many directions lack political wisdom—with some brilliant exceptions such as Jan Smuts. The Dutch Reformed Church dominates the lives of many of them and it taught that the black man bears the accursed mark of Cain and is therefore set apart from Christian humanity.

EAST AFRICA

Several of my friends returned from South Africa by the East Coast route to visit Kenya, then in its early stages of agricultural development. A. D. Hall was among them and he later published an interesting report on the subject. I could not go then but the opportunity came in 1950 when the British Council invited me to go there to lecture at various centres, meet farmers and agricultural officers, and discuss problems with them. The Council's Representative, the able and versatile R. A. Frost, was our host, and under his guidance and with much help from his charming and efficient wife Elnor and I made a tour of some 6,500 miles in Kenya, Uganda and Northern Tanganyika, mostly in an American car, the English one proving unsuitable to the rough and dusty tracks over which most of our journeying was done.

All three countries are of absorbing interest, especially Kenya. For its size it has a wider range of climates than any land I know, even New Zealand: varying from hot dry tropical conditions in the Rift Valley to the snows of Mount Kenya; although the equator passes through it a considerable high-lying area has a climate well suited for European habitation. Nowhere else can

the agricultural experimenter find greater diversity of conditions in such close proximity.

Up to about 1900 it had been only sparsely inhabited; of its many African tribes, none is apparently of long residence; some are Nilotic and came from the north, others are Bantu from the south. Great stretches of the country were bush-covered and infested with tsetse fly and other noxious insects and there was much big game. From 1900 onwards British settlement of the Highlands began with soldiers from the Boer War; somewhat later Indian coolies were brought over to help in building a railway. Other settlers came from South Africa and some from Europe; more British went after each of the two world wars. There had been a bad time after the second war, but by 1950 that was over. There were three well marked and sharply distinct groups of residents: African, Indian and European, predominantly British. The pioneer stage was past and the colony was moving to self-government; the extremely interesting problem had arisen of finding some political system that would enable the three groups to live at peace and give each the fullest opportunities for development to the highest level it could attain. Both the agricultural and the social problems fascinated me and I only wished I could have stayed longer to study them.

The fundamental difficulty of the social problem is that the three races differ completely in their historical, cultural and religious background: there is nothing in common. In this it resembles the problem in South Africa, Palestine and India; in the two latter countries, however, there are only two groups. The only solution yet found in those countries has been segregation: in Palestine and India two different countries, and in South Africa *apartheid*. This solution is not acceptable either to the British or the Kenya Government: something more on the lines of the British Constitution is desired. The United Kingdom is itself multi-racial, but all its races have the same cultural and religious background and a common language; their historical development has been inextricably interwoven. Canada also is bi-racial and bilingual, but again there is the common cultural and religious background. In Kenya, however, these unifying influences do not exist.

The problem is complicated by the circumstance that the

impact of western civilization on the African has not been wholly good. The tribal systems had many cruel features intolerable to us, but they had definite codes of conduct breaches of which were drastically punished. In all parts of Kenya the old inhabitants gave us good accounts of the natives as they had first known them: honest, faithful and with definite moral standards. But the movement of young men from the reserves to the growing towns and to the European farms has caused a good deal of detribalization with unfortunate results. We heard also about the harmful effect of the activities of certain British politicians among the Africans, especially the vocal but unpopular Kikuyu, whose speeches had given the impression that the European farms really belonged to the Africans. This may not have been intended, but visiting politicians should remember that our current political ideas on democracy have no counterpart in African experience, nor have the African languages words to express them fully. Before going to Africa they should submit their prospective pronouncements to the School of African languages of the London University for translation into the native language and then back translation to English to see if the impression is really the one they wanted to convey, and also whether it is wise to make the attempt.

Nor were we quite happy about the missionaries. Some were very good; we stayed with one whom we deeply respected: he and his wife had with great self-sacrifice done devoted work in their district. But there was much overlapping. On one stretch of road we counted no less than seven entirely distinct missions—British, American, and Continental—which must have been extremely confusing to the Africans. We heard of one old reprobate frequently up against the law who after each spell in prison changed his mission in the hope that the new god would afford him better protection against the police than the old one. The natives are very fond of ceremonial and some degenerate forms of ritual have arisen. We heard of cases where some of the hymns had been taken literally, e.g. one about being washed in blood. Also much of the Old Testament is not really enlightening for Africans.

There is, however, a great desire for education: not for its own sake or for any particular skill it can develop, but because it

offers the prospect of a job in the shade. For the African loves leisure and enjoys sitting in the shade as much as any Englishman; if this involves neglect of his work he suffers from none of the qualms of conscience the Englishman might be supposed to feel.

Also the Africans love bus riding. Many times in our journeys have we passed motor buses ambling along the rough track, packed with African men, women, and children obviously enjoying themselves in spite of the heat and the dust. On the road we often met native women, strong and well built, clad in a robe folded round the body above one breast and below the other, or a coloured cotton slip reaching from the neck to the knees, trudging along dragging great bundles of firewood or hay, or carrying on their heads petrol tins full of water, or large well loaded home-made baskets, and not infrequently a small child slung at the side. They were ready enough to smile and always seemed cheerful. The man if he was there did not share the burdens but walked in front unloaded, often looking rather gloomy. Anywhere near the Highland region he might be wearing European clothes: shorts, jacket and hat ranging from something rather smart down to varying degrees of dilapidation, or a discarded Army overcoat, otherwise he wore a tribal robe.

We traversed miles of unoccupied country carrying only bush, affording very rough grazing to occasional groups of cattle, sheep and goats tended by boys with long spears. Periodically we passed a group of huts, usually in family clusters on their holdings (shambas). Each tribe has its reserve and owns the land: this cannot be alienated, not even to other Africans. But each family in the tribe has the right of cultivating a certain area: this right is heritable and is most jealously guarded as it ensures against want in old age: deprivation is the severest penalty, short of death, that a man can suffer. There were occasional small towns, but nothing corresponding to an Indian village: at road junctions or other central positions there was often a little row of shops called the market where the cultivators could buy and sell. Those we saw were practically all run by Indians, the Africans apparently being unable to compete with them. Even the most remote of these markets had a remarkable assortment of goods, from English chocolates to wrist watches and gaily coloured calicoes.

The trader has penetrated the deepest recesses of Stanley's Darkest Africa: I heard of a missionary who declared that he had often been in places where the Gospel had never been preached, but never anywhere where you could not buy a sewing machine on the hire purchase system.

The women seemed to be the pillars of the tribe. They grew and harvested the food; using the hoe as their only tool; the man's duties seemed to end when he had broken up the ground in readiness for sowing. He grew the cash crop, however. Some of the tribes were good cattlemen—which has given rise to the idea that Africa might become an important meat exporting country: this I think very improbable unless the difficulties caused by the long dry season and the prevalence of diseases can be overcome. The cattle are valued as marks of distinction and also as the *lokola* or bride price; in one district where we stayed a usual price per bride was one cow, two bullocks, and thirty-five goats, with some adjustment for quality; at current market prices this would represent some £20 or more if the animals were in good merchantable condition which they certainly would not be. The young men were complaining that prices were rising and only the older men could afford brides; the women however were objecting to being devalued. Irregular intercourse was severely punished: in one tribe we were told that an adulteress would be stripped and left out to be devoured by ants. The African is very destructive of tools: when an instructor pointed out to a cultivator that if he bought a plough he could do better work than one of his wives with a hoe the answer was: 'a woman is cheaper and she needs no spare parts'.

The Indian community is now larger than the European and has made itself indispensable to the country. The Indians are the traders: practically all the retail trade outside of Nairobi, and a great deal there, is in their hands; they—especially the Goans—are the confidential clerks, higher in the scale than they are to a large extent the bankers. Also they are the chief craftsmen, Africans having apparently little gift in this direction. They are not, however, very popular with the cultivators who sell produce to them because they are said to offer too low a price—a usual peasant's complaint: there had indeed been some rioting on this account by the cotton growers of Uganda a little before our visit.

Again the Africans seemed powerless: the obvious remedy of forming a Co-operative Society is hampered by their lack of sense of social responsibility and the consequent tendency for the officials to embezzle the funds. I mentioned this in one of my lectures to an African audience and the remark was greeted with great laughter, which I could not understand till I learned later that a man sitting on the platform near to me had just come out of prison for this offence. An Indian community is always rigidly stratified; and among the higher groups of business and professional men we met some very attractive people who knew friends of ours in India; we spent some pleasant evenings in their delightful homes.

The British settlers are, however, the backbone of the country. They opened up the waste lands, made them habitable and cultivable, and they are developing for the first time a highly productive system of agriculture which furnishes not only food but much needed money for the State. Unlike Tanganyika, Kenya has little mineral wealth, and the money to run the country comes largely from three cash crops which the British have developed to high standards of quality: coffee, tea, and sisal. These are perennial crops, and cannot well be integrated with food crops, they are therefore grown in specialized plantations, some owned by companies. Two other cash crops are annuals: pyrethrum and cotton; these can be fitted in with food crops and are grown both by Africans and Europeans: cotton in Uganda is entirely African, there being no European settlers. The British farmers are successfully fusing livestock and arable husbandry; elsewhere this has been one of the surest ways to increased production. By creating their farms out of the waste they have won their title to them. Many technical problems still remain to be solved: good work has already been done by H. H. Storey, H. C. Thorpe, H. C. Pereira and others, and much will certainly be done by the recently established East African Agriculture and Forestry Research Organization directed first by B. A. Keen and now by E. W. Russell. Output can confidently be expected to increase.

Some of the settlers' homes are very attractive, well designed, with comforts and good books reminiscent of the better middle class homes of England, from which indeed a number of the owners had come, having found it impossible to lead the lives

they wanted there. Some of the farms, necessarily large in pioneer conditions, had reached a state of development where either division or the infusion of more capital was desirable; more young British farmers are certainly desirable.

Most of the burden of running the country falls on the British, for the Africans are very lightly taxed and the Indians are currently believed to evade a good deal of their share.

But the British farmers need the Africans as workers. The Africans are neither very skilful nor industrious, and some four or five times as many are needed as for corresponding work in Great Britain: wages are however low; 15s. a month plus a hut and food—1½ lb. maize daily and 1 lb. meat weekly was a not uncommon allowance. The Kikuyu are among the best cultivators, but no tradition of good farming exists anywhere: indeed before the arrival of the British there was no wheel, no plough, no use of animals for work or for transport, only the hoe, a large knife and primitive shifting cultivation. Nor is there much desire for improvement. Attempts to introduce rural science into the native schools have not been well received; the Agricultural Department at the Makerere College has few African students and when I visited them none wanted to become farmers; all were hoping for Government posts. On the other hand the Egerton Agricultural College for Europeans was full of keen young people wanting to farm. I well remember seeing a girl driving a tractor and reaper to cut the maize: it was ripe, a locust invasion was feared, and the crop had to be got in as speedily as possible. The day was very hot and a group of African workers were resting under the trees in the shade, but she went on. At the end of the row she had to dismount to make a small adjustment: I asked her: 'Do you like this job?' 'As a rule, yes,' she said, 'but today it's beastly hot. But the crop has got to be cut and there is no one else to do it so I'm getting on with the job.' 'What school do you come from,' I asked. 'Roedean,' she said, and of course there was only one thing for me to say: 'That's what's expected of a Roedean girl; go ahead and good luck to you.'

It should be possible to make tractors more comfortable for work in the tropics, and to plan buildings so that more of the work can be done by white people, but the dependence on the African will always remain. The standard of African farming will

have to be raised so as to improve the diet which at present is deficient in protein and in some of the Vitamin B group, a probable cause of part at any rate of their lethargy; cash crops will need to be improved so as to provide more money for the amenities which the Indian traders offer; but for both these the steady improvement on the British farms will help; a farmer's best instructor is always a neighbour that farms better. Co-operative farming is being demonstrated to the Africans, and although many of them are suspicious that there is a catch in it somewhere it seems to offer the best way to real improvement. Political advancement is only illusory unless it is accompanied by solid economic progress, and in Kenya this can come only from higher farm output. The key is with the British farmers and planters and anything that hampers their developments must retard the progress of the whole country.

On all these journeys I was impressed by the great opportunities for young people of character and determination in the countries I had visited. But all my overseas friends emphasized the absolute necessity of good human quality; they resented the idea of receiving our failures. The British Association in 1923 had set up a committee on the training of boys for overseas life; a little later I was appointed chairman and with the help of a number of teachers we put forward in 1929 a curriculum that would be suitable for boys going abroad and equally useful for those staying at home. Many of the teachers informed us, however, that boys no longer wished to emigrate, and schools from which a certain number had regularly gone out each year reported that this was so no longer.

From the outset I had been greatly impressed by the close connection between Agricultural Science and Geography and my first published paper at Wye had been read before the Manchester Geographical Society in 1905. My old friend H. J. Fleure interested me in the Geographical Association and in 1923 I was elected its President. I regularly gave them accounts of my various journeys, stressing the relationships between the two subjects. I thought then, and still think, that a geographer is an indispensable member of any team engaged in land utilization schemes.

Later on I became President of the Le Play Society, the moving spirit of which is the very able and energetic Margaret Tatton, who organizes interesting and successful vacation tours in this country and in Europe for the purpose of studying the relations between the environmental conditions and the activities of the population, a subject—'place, work, folk'—started by a Society founded by the French Economist P. G. F. Le Play in 1856 and brought into this country by Patrick Geddes. I took part in a number of these journeys as leader



3 In my room Ratham ted 191.

CHAPTER XV

Europe's Farmers and Peasants¹

AFTER the International Soil Science Congress of 1927 I carried out my intention of establishing closer relationships with overseas experts, and during the next twelve years I visited most of the countries of Europe either on lecture tours at their invitation or as official delegate to one of the International Agricultural Conferences that became increasingly numerous in the hope that this would foster peace—till war stopped them all.

THE NETHERLANDS

The Netherlands are especially famous for their wonderful reclamations of land from the Rhine marshes and the sea. They were made possible in the first instance by the winds that seem to blow continuously, keeping the windmills working the pumps that lifted the water into the sea; these are now, however, largely replaced by modern motor-driven centrifugal pumps of great efficiency. I visited the Zuyder Zee scheme five times while the work was in progress. The most dramatic period was when the dykes were completed and the water was being pumped out: as the level fell the fishes collected in the deepest places and the fishermen were able to scoop them up in great quantities flooding the adjacent towns and villages with their catches. These reclamations are models of their kind. First comes the full scientific survey, then the pilot scheme, then after full consideration the full scale operations. Omission of any of these stages easily results in failure: our Groundnut scheme has furnished a classical example.

We made a most interesting visit to the country in 1937

¹ The difference between farmers and peasants is that farmers grow crops for sale and buy their food while peasants produce their own food and sell only the surplus. Modern taxation, however, usually compels them to produce some commodity expressly for sale

when the Students' Organization invited me to lecture at the five Universities. At each we were met at the railway station by the President in tall hat, frock coat and badge of office, accompanied by some of his colleagues; we were then escorted to the car which was at our disposal during our stay. The lectures were in the evening, with the pleasing custom that they started about fifteen minutes late (the 'professor's quarter of an hour'), there was a break for tea and cigarettes in the middle and an adjournment at the end to a restaurant for drinks and discussion, so that though I started at eight the end did not come till near midnight. I began at Utrecht, famed for the investigations of Professor Wendt on auxins, and was very interested to hear a first-hand account of them from one of his assistants, Professor Konigsberger, who succeeded him. Much interest was being taken in the trace elements: ter Meulen was working on molybdenum at Delft; Sjollemma on copper deficiency at Utrecht; manganese, magnesium and sodium deficiencies were also being studied and of course it was a great delight to see the investigations on soil and plant pathology at Wageningen.

The Universities were closely linked with the Dutch Indies, and it had been a usual and wholly beneficent custom for promising young scientists to serve for five years at one of the experiment stations there before taking up a University appointment at home. By 1950, the time of my last visit, this link was severed and much disruption of life resulted, but the situation was being faced with courage.

DENMARK

In 1930 I was invited by the Danmarks Naturvidenskabelige Samfund, a society of leading scientists and business men, to lecture at Copenhagen and then to go round the country discussing problems with the local experts. I had a great welcome; my hosts on various occasions included the Prime Minister, the Minister of Agriculture, the British Ambassador, and many farmers, large and small. The Danes, like ourselves, had suffered greatly in the 1880's when cheap grain from North America flooded the markets. Most Western European countries tried to keep it out; Denmark on the other hand accepted it and converted it into high quality butter, eggs and bacon for the British market. Public

opinion required the establishment of smallholdings to absorb the growing population, and in order to give them the business advantages of large enterprises co-operative methods were developed which proved so successful that they have been widely adopted elsewhere. But it was early realized that co-operative methods could succeed only in an educated community with high standards of moral and social responsibility; adult Folk High Schools were therefore established to inculcate these and other desirable qualities.

Denmark provided an excellent demonstration of the results obtainable from a well organized and well conducted system of small farms. The standard of life is good, the children are healthy and well nourished. But work is strenuous and the hours long, especially for the women. Work started at 4 a.m., breakfast was about 8.30, dinner at 12 with a period of rest till 2 p.m.; then work till 4.30, then a short break for tea followed by work till 7 p.m. after which came supper and bed. There was no Saturday afternoon holiday; Sunday's occupation was to look round and plan next week's work. The children also helped: I saw some delightful little family groups hand-weeding the roots that were to feed the cattle in winter; and small children changing the positions of the tethered cows. The men took one day's holiday a year to go to the agricultural show but the women did not; they did not even go to the town to shop: travelling vans brought things to them.

The products were milk, eggs and pigs. All were delivered to the local co-operative factory which did the processing and sold the products through a larger Society; the farmer thus received a high proportion of what the consumer paid. The small farmers do not eat the butter their cows produce; instead they eat margarine made in the town from oil seeds, some home grown but mostly imported from Africa.

Talks with some of the young men revealed a weakness in the system. There is no way of advancement: no farming ladder; once a smallholder always a smallholder. Enterprising youths tried to find work in the town or to emigrate, others obtained work on larger farms where life was much easier because wages, hours, and other conditions of work were regulated by statutory bodies. But there was no lack of applicants when a smallholding became

vacant or a new group was completed in one of the heath reclamation schemes that were being so well carried out; some of the keenest applicants were sons of middle or large farmers who wanted to gain experience before taking over the paternal farm. One of the great advantages of the British landlord and tenant system is that it does allow a competent and enterprising young man to advance; numbers of now substantial farmers began as farm labourers.

Like Holland, Denmark depends to a large extent on the British market: both retain their hold because of the supreme honesty and efficiency with which production and distribution are carried out. The world owes a great debt to both countries for many advances in agricultural technique and organization, and the generous way in which information about them is given to experts from other countries.

THE USSR

In 1930 the Government of the USSR invited the International Society of Soil Science to hold its second Congress in Leningrad and Moscow and afterwards to make an excursion similar to that in the United States: I accepted my invitation with great pleasure. The new regime was of course firmly established but there was still a spice of adventure about a visit to the country, and some of my friends in Germany and Poland whom I met *en route* were doubtful about the outcome. At Leningrad I was cordially welcomed by some of my 1927 friends, especially Polynov and the Lebedeffs; Gliuka unfortunately was dead. Anisia was there and presented me to some of her friends: with great pride she took me to the Anti-God exhibition at St Isaacs Cathedral; among the exhibits was a Foucault pendulum the relevance of which I never clearly understood. N. I. Vavilov the geneticist, then at the height of his fame, showed me some of the vast collection of wild forms of cultivated plants he had made during his remarkable voyages of botanical exploration, and which he was growing in his huge experimental grounds with a staff of over 1,000. It was magnificent material and we fully expected a long series of brilliant investigations, nor for a time were we disappointed. His energy was prodigious and his health seemed unbreakable. All the same some of my Russian friends were uneasy about him;

emergence to distinction, they said, was risky: safety lay in remaining obscure. And sure enough in due course Vavilov fell.

The principal meetings of the Congress were at Moscow, the attendances were very large and included great numbers of 'workers'. The official welcome was by Rykov, the Chief Commissar, and I was deputed to reply; the meeting was in the Kremlin in St Andrews Hall of the Palace of Nicholas 1st and I spoke from the dais where had been the throne of the Czar. Meanwhile the camera men were dodging about in front taking flashlight photographs; this also happened on a number of later occasions: I always found their attentions disconcerting and never got used to them.

Unfortunately the President of the Congress, K. K. Gedroiz, was ill and we did not see him. I was very glad to meet D. N. Prianishnikov of the Timiriazev Academy of Large Socialistic Agricultural Economy to see the ingenious work he was doing on the nutrition of plants. By far the most popular of the Russian scientists among the young Russians was V. R. Williams, son of an American Engineer with a Russian wife, who was working on soil management and emphasizing the importance of periodical growth of grass, which he had learned from England. He suffered from some facial trouble which made one cheek hang heavily and was of course a serious disfigurement, but he worked bravely on, and devoted himself to his large body of students whose gratitude was most touching. Certainly one could never wish for more responsive and devoted students than the young Russians, especially the women students.

Before the official meetings at Moscow ended it was decided to hold the next Congress in Great Britain in 1935 and I was elected President.

The tour that followed lasted twenty-four days and was extraordinarily interesting, covering the steppe, the Volga Region, the Ukraine, and the Caucasus regions including Armenia. Impressive efforts were being made to apply science to agriculture: existing experiment stations were strengthened and new ones set up. We visited a number of these, the Directors were usually ardent young Communists with little or no knowledge of science or agriculture and chosen because of the soundness of their political views—and liable of course to degradation when standards of

orthodoxy changed. The great purpose was to build up a Socialist State, and it was considered most important that the Director should know what that meant; technical information could always be given by his staff of experts. So at each station we had to listen to long loud speeches on Lenin-Marxism fervently declaimed with eyes looking to the skies and right hand held up in the manner of the famous Lenin statue which had become the model attitude for the enthusiast, the photographers meanwhile busily doing their piece.

This infusion of political dogmas into science gave a curious turn to the scientific journals. It was *de rigueur* to open a scientific paper with a quotation from Lenin, Marx or Engels and add something about Dialectic Materialism: then the writer could get down to business in the usual way.

The State Planning Machinery was fully operating and I saw a good deal of A. A. Yarilov, who was responsible for much of the agricultural part, but never quite warmed to him as I did to some of the others; he was, however, certainly very friendly.

The old agricultural system had been broken up, the landowners liquidated and their houses and estates taken over by the Government; in some cases, e.g. the famous Orloff stud farm, the special activity was being continued. We saw some of the old type peasant villages but did not explore them so I never met the old type of mujik in his historic setting: he had been a cheerful soul by all accounts, shrewd, fond of children, singing, dancing and vodka, maudlin and confessing himself a miserable sinner when drunk, superstitious and usually in debt, inured to hardship, brutish and capable of great cruelty. He was liable to be flogged by his master and in turn would flog others including his wife, even on occasion the village priest, if after paying him to pray for rain it failed to come.

Collective farming was not yet far advanced but we visited the great State Farm Gigant—'The Giant'—in the Caucasus region. This was the largest: it covered half a million acres and had an associated training and testing farm—Verblaid, 'The Camel'—of a quarter of a million acres. The Director as usual was a politician and he claimed considerable success. The workers were housed in great barrack-like buildings; each family had its separate bedroom but all shared the same large living and dining hall,

cheerless and comfortless, the walls adorned only with political slogans. What most appealed to my Russian friends was the vast size of the farm. This passion for size is characteristically Russian and survives much proved impracticability. At the Kremlin I had been shown the bell which had been the biggest of its day but it was too heavy for the tower; it fell and broke, and still lay unused; near by was the cannon that had also been the largest in its day but no one had dared to fire it. These were relics of Tsarist times: but on a later visit I found that Gigant had had to be subdivided.

On the journey we saw something of the problem of the homeless children: swarms of them roaming under the leadership of some vigorous youth, their parents killed in the Revolution or dead in the famine and they themselves simply abandoned. They became expert thieves and on some parts of our train journey all windows had to be firmly closed at night in spite of the heat to save our belongings from being stolen.

Throughout our movements were unrestricted and as several of my friends spoke Russian I had numerous conversations with people outside the Congress. On various occasions I was invited by my Russian friends to their homes. Dinner was always a lengthy business and might last from 9 p.m. to 1 a.m.: food was severely rationed and it sometimes appeared that the whole week's supply or more was on the table. But Russian hospitality is unbounded. It was evident that my friends were living in very uncomfortable conditions: their nice homes had been invaded by 'workers' who had been parked on them and whose dirty smelly ways and drinking habits were hard to endure: if my friends complained they were liable to get even lower specimens. Life was terribly hard on the women, especially those of the highly educated cultured class who at their best could hold their own with any in Europe. But it was their fate—their 'sudba'—and they endured it with magnificent courage.

On the other hand the 'workers' who had come out well were wildly enthusiastic, and full of hope: 'it has been bad for us but will be better for our children', was often said to me. 'First things must come first', as an American engineer, now a Soviet citizen and *plus royaliste que le roi*, said to me on a later visit, explaining why the need for developing heavy industry had so crippled

production of consumer goods that he and a friend had to snare one pair of trousers for going out to parties—and a shocking pair at that, made of white calico. Increases in output of pig iron and of steel made front page news in the papers and formed topics for conversation. Many of the excesses of the revolution days had ended but evanescent marriages were still fairly common: a couple could sign on at a Registry Office and in two or three weeks sign off and make new groupings. Lenin had disapproved of this sort of thing but the housing shortage in Moscow necessitated a good deal of crowded and indiscriminate sleeping arrangements. Abortion was practised: a doctor told me he carried out many, often without using anaesthetics as they were difficult to get; later it was forbidden. There was much drinking of vodka, a beverage I never managed to like, and for the first time in my life I could have caviare *ad lib.*

Many of the churches were put to secular uses and those that still functioned were hampered by taxes and refusal of ration cards to the priests. Numerous devices were adopted to keep them going: I was told of one that let itself out during the week as an Anti-God club in order to provide the necessary funds for carrying on its Sunday duties; in spite of official disapproval many people still attended. I was deeply impressed by the burning patriotism of the young people and especially by the wonderful capacity for self sacrifice shown by the women. I have seen a peasant woman, travelling on the lower deck of the Volga boat with her man, buy for their dinner some black bread and a dried fish, cut off the head and tail for herself while she gave him the middle. When it happened I had no difficulty in understanding the failure of the Germans before Stalingrad.

The whole journey was extraordinarily interesting and I left Russia with very mixed feelings. I liked the enthusiasm of the young 'workers' and their keen desire to establish a better life than had been theirs before the Revolution, and particularly their avidity for education which was now open to all of them, while in the old days they could have it only if the landowner agreed. Their belief in the superiority of all things Russian, and in the marvellous superiority of their scientists over all others was quite touching and I was often asked if I would not like to give up Rothamsted and go to live with them. But on the other hand there

was the great streak of terrible cruelty in their character and I was told some appalling tales of suffering deliberately inflicted by the 'proletariat' on men, women and children of the upper classes: Jenny, one of my best friends, had suffered terribly.

I returned to Russia in 1934, 1937 and 1939 taking small groups of the Le Play Society and each time making a round similar to that of the first visit but more slowly and covering less ground per visit though in the aggregate getting farther. Although I learned to read Russian I never managed to speak it. In the villages I could not infrequently find a Stundist, a descendant of one of Catherine's German colonists who, having kept their religion, kept also their language, reading the Bible in German; at the Experiment Stations there was always some member of the older staff who spoke either English, French or German. But the younger members had no language but Russian and they saw no necessity for any other; they were more and more being assured that the best scientific work in the world was being done in Russia, indeed that all great scientific and technical discoveries had originated there. But I never had the same freedom of movement or of intercourse with agricultural experts as in 1930; restrictions got worse and by 1939 my friends were clearly afraid of being seen with me; at the great Agricultural Exhibition at Moscow in that year if I met one of them he would after a hasty greeting quickly disappear into the crowd.

Life for a high official was very risky and in my successive visits I never met the same person twice as Commissar and even some of the scientists disappeared. Rykov, so powerful in 1930, was gone in 1934; the Commissars for Agriculture were different each time. N. M. Tulaikov, Head of the Saratov Experimental Station in 1930, had by 1939 gone no one knew where, so had Lebedev the soil expert. Years afterwards in India I met a Hungarian refugee who long had been in prison in Baku having apparently been forgotten by the authorities; he told me that Lebedev was there also but was later sent to the White Sea Canal Scheme where presumably he had died. But the saddest case was that of N. I. Vavilov. He was at his maximum of glory in 1930, and on each subsequent visit he had fallen lower. His great rival P. Lysenko was of peasant origin and looked it, thus having an advantage over Vavilov who was unmistakably bourgeois;

Lysenko was the 'idol' of the workers as the embodiment of the Revolution: the peasant who became an Academician. In 1936 at Odessa he showed me his work: it did not begin to compare in interest or importance with that of Vavilov, but as we went round, people seemed to spring up from nowhere and joined us till in the end we were some twenty-five or thirty in number; all listened intently to Lysenko, his hold on them was remarkable. The last time I spoke to Vavilov was in 1937: in 1939 I was not allowed to see him and by 1942 he was dead, having been banished to the far north-east of Siberia, but the time, place and manner of his death are unknown. Lysenko meanwhile prospered but by 1954 he was being criticized and he may yet suffer the same fate as the man he persecuted.

The pace of Collectivisation was being forced but on the farms I visited there was much dissatisfaction in 1934 because the peasants had had to give up their land, implements and livestock to the Collective. I saw a train load of objectors starting off with armed guards into the unknown. In the Ukraine we saw notices stating that there was a Purge of the Party and anyone knowing anything about the following must come forward and give evidence—then followed the list of names. By 1937, however, the situation was different: each member of the Collective now had his own piece of land and was at liberty to keep such livestock as he and his family could look after, but they were forbidden to employ paid labour. With sparkling eyes the Committees showed me the Title Deeds recently arrived declaring that the land was for the use of the Collective for ever, and I was told of Stalin's promise that each peasant was to have a cow. This gratified the peasant's unquenchable desire for a piece of land of his own, and they spent so much time on their holdings that the collective farm got neglected. Then came a law requiring that at least 100 days a year must be worked on the Collective; the peasants did this but chose the days that best suited them. The law was stiffened and there was trouble: in 1939 I was not allowed to visit a grain farm.

This permission to own livestock, and the granting of what is virtually a permanent lease of the land which the peasants thought amounted to ownership, was very disconcerting to my more orthodox Communist friends. Private property in means of pro-

duction was supposed to be absolutely forbidden, yet before long the greater part of the country's livestock—its source of meat, dairy produce, and eggs—was privately owned by the peasants and they flatly refused the State Farm method which would have accorded better with Communist doctrine. So an element of internal contradiction and ideological impurity abhorrent to the strict Communist was introduced and it has been a source of constant trouble ever since; even at the present time, twenty years after the Stalin Charter was given, no solution has been found so far as I know.¹

Propaganda was increasing in volume and intensity: it was blared out in the corridors of the trains, the Parks of Rest and Culture and the cinemas; and figured largely in the school books. I bought some of these to see what the children were taught about other countries. There was very little: in one of the best the only reference to Great Britain was a statement that in England there are only two classes, the rich and the poor, and the rich hate the poor 'who are like a bone in their throat'.

In 1939 I was shown sketch plans of the proposed House of Scientists in Moscow which was to be the biggest in the world; it was to be surmounted by a statue of Lenin, also the biggest in the world; the head was to be so large that it would hold four laboratories. It seemed a pity that for so much of its time it would be hidden in the clouds. It is not yet built.

Bernard Pares was with me on that visit and we called on the Commissar of Education to ask if facilities could be given for exchanges of students so that the young people of the two countries could get to know each other better. 'We will think about it' was the answer. Sir Bernard pointed out that he had received the same answer in 1934, but nothing more was said and the question could not be reopened. The result is that post-war Russia is still an unknown country: the visits of selected delegations serve only to show Russian skill in propaganda which is already known to be supreme of its kind. In spite of their attractive sociability the Russians are very suspicious of foreigners and peculiarly lacking in curiosity about other countries; while their in-

¹ I gave fuller descriptions of the Collective Farms and their changing characteristics in *The Slavonic and East European Review*, 1938, Vol. 16, pp. 1-21; and 1946, Vol. 24, pp. 56-65.

satiable desire for a bigger and bigger country has always tended to make them absorb their neighbours whenever the chance has offered. One can work with the Russians, but it must always be for the greater glory of Holy Russia.

POLAND

During the period 1930 to 1939 I visited Poland five times making considerable journeys in 1936 and 1938. Before the 1914 war both Poland and Russia had had similar agricultural systems. The larger part of the land (about 70-75 per cent in Poland, about two-thirds in Russia), already belonged to the peasants, but each man's holding was in strips scattered over a wide area so that all could share the good and the bad land. The cropping was a simple three-course rotation: (1) winter corn: chiefly rye, but wheat in the south; (2) spring corn: rye, oats or barley; and (3) fallow. Each village had its area of common grazing land for the livestock, including geese which are very popular in Poland. The remainder of the land was held by large landowners, usually one for each village, whose business it was to protect the villagers and in return claimed various services from them; these however were gradually commuted for money payments. The system is very ancient, and extended from Northern India, across Northern Europe to England; it had various social advantages but the double weakness that its level of efficiency was low and could not be raised to provide for a growing population. Both the Russians and the Poles recognized that it must go: the Russians were replacing it by large State and Collective Farms on Marxist lines, the Poles by small privately owned farms linked by a Co-operative system as in Denmark. I wanted to see how the two methods compared.

There was the fundamental difference that the Polish method was entirely voluntary while the Russian was compulsory, dissenters being simply liquidated. There was also the psychological difference that the Russian peasant, being accustomed to the idea of some degree of governance by a village council, easily accepted the Collective Farm Committee, while the Pole is a strong individualist and prefers to go his own way; change was therefore slower, but much less painful than in Russia.

The old agricultural system was not only of low productivity

but its labour requirements were badly distributed; the peak periods pressed heavily on the women and children while in the slack periods the men were liable to take too much vodka and get into trouble unless they practised some craft or had outside work. The system required much child labour: large families were a boon, and a stork's nest on a cottage roof was a source of pride. Happily the peasants, especially the men, were very fond of children.

The system was primarily for subsistence: the diet consisted of rye bread, porridge, potatoes, dumplings, vegetable soup (especially beetroot) with pieces of pig's fat in it, milk unless a milk factory took it; at times of hard work some vegetable oil. Meat, fish and sugar were rarely eaten except by 'rich' peasants or on very special occasions. Neither tea nor coffee were consumed nor any other hot drink, only cold water. The holding had also to provide cash to pay the Land Taxes, the Church dues and the considerable cost of the celebrations which custom required for births, deaths and marriages. Daughters always needed a dowry and were therefore a responsibility: I remember congratulating a peasant on his very good looking and attractive daughter; he looked a little glum and said: 'But she will cost me a cow and perhaps two pigs.' Money to meet these and other heavy charges was obtained by the sale of surplus livestock and grain, usually to a Jewish middleman, and the trade was so well organized that no peasant had access to more than one of them; only one price was therefore offered, and the peasant usually thought it was too low. If as often happened neither livestock nor grain was yet available for sale the middleman would advance the necessary money but his interest charges were high. He was very unpopular and there was a great deal of antisemitism.

The small things—eggs, poultry and garden produce—were the woman's perquisites and she took them to town on market days. I greatly enjoyed those days: the women in their gaily coloured shawls sat with their baskets in front of them in the cobbled street, chatting and laughing, haggling with purchasers about the price and quality, with their waggons lined up behind them. The day's takings might not be great, but it was a day out and was evidently enjoyed.

Life had its attractions. The peasants had a very lively sense of colour, and some of their weaving was beautiful: the materials

were home-grown, home-spun, dyed and woven at home, using home-made dyes and local traditional designs. The people were very fond of music and dancing, and never missed an occasion to don their beautifully embroidered clothes and arrange a dance. I got in for a number of these and thoroughly enjoyed them, though I could never learn the steps. As good Catholics they observed the prescribed Saints' days and they kept up some festivals that were still older, preserving traces of old fertility cults. I was in the little village of Niekowic on the occasion of the festival of the Mother of God, Protector of Green Plants (August 15th). The peasants brought sheaves of green plants to the church to be blessed, then carried them home, dried them, and stored them as medicine for sick animals. After service we adjourned to the fair held in the village street where there were swings, roundabouts worked by a man turning a handle, and stalls for the sale of cakes, sweets, toys, etc.

I attended also the Harvest Home at MYDANIKI near Cracow. The guests sat with the master and mistress on the veranda of their house; presently the little peasant procession arrived, all dressed in costume, first a band—chiefly fiddles—then a group of girls, four of whom carried a little wheat stack; they stopped at the foot of the veranda steps and one of them sang a song composed for the occasion, celebrating the events of the harvest. The harvest had been good, she said, the weather not too bad, the master had come out to see us except when it was raining, the mistress had not come out, but as she was dressed in silks and satins you could hardly expect her to do so; but her service was very good and might she live to be 100—a common wish among the peasants. Some students had come from the college to help, but they knew nothing and were of little use, two of them met two of us girls in the forest one day and said 'Maidens, have you any cushions, because if so we will sit down and make love to you, but of course we cannot sit on the hard ground'. And so the song went on and no one knew who next would figure in it, for this was a privileged occasion and the song might include anything about anybody. But it was all so kindly done, and with such merry twinkling of the eyes, that no one could possibly feel hurt. Then the procession came up the steps into the house, deposited their wheat stack which would remain until the next Harvest Home.

Each person was given a glass of vodka and then we all adjourned to the barn for the dance, each girl choosing her partner by giving him a ribbon. I was chosen by the leader and we had a very good time, but before midnight I gave it up as it was getting too noisy and more vodka was floating about.

The large estates occupied about one quarter of the land. Unlike the old Russian aristocracy the Polish landowner had usually lived on his estate and some of them were even agricultural improvers. The hostesses were most charming and hospitable, many of them musical and well read in English, French and often Italian, speaking one or more of these languages while the men spoke German. I spent many happy hours in some of these homes.

The Polish Government was reducing the size of the large estates to make small farms; they were encouraging the production of more lucrative products involving better distribution of labour: more livestock, poultry, dairy produce, fruit and vegetables. Co-operative factories on Danish lines were set up to take the produce, grade and pack it, and sell it in the best market, giving the peasants a far better return than ever before. Great educational efforts were being made: I met some most devoted teachers who were spending lonely lives in very remote places but doing splendid work among the children. And there were some remote places. In the Pripet Marshes I heard of a village that had passed through the 1914-18 war without knowing anything about it: the villagers had suspected that something was happening as no one came to collect the taxes, but they did not feel called upon to make any inquiries. Agricultural education was also being developed.

Agriculture alone, however intensive, could never absorb the rapidly growing population with its high birth-rate and diminishing death-rate. Emigration, which had so long provided an outlet, was becoming more restricted, and industrialization was therefore being developed. Each time I went back I saw marked progress.

Then came the tragic calamity of the 1939 war, a destruction much fiercer than in the first war and the loss of many of the best of the young people by death or by exile. The brief spell of twenty years of freedom had ended and once more Poland was brought

under an alien rule. Few countries have such attractive people and such sad histories.

I was well nigh trapped in Poland during the war. I had been in the Volga region and the steppe during the summer of 1939 and out of touch with news: I came home through Poland late in August and was happily staying in the country with an old friend; I was pressed to remain longer but had to start home because I was due to give a lecture that needed lantern slides and these were not yet ready. On arrival at Warsaw I saw the turmoil and got my first news of trouble and left at once. There was a twelve hour wait at Berlin; some of my German friends of the Kall-Syndikat met me there and we spent the day (August 23rd) together; we toasted each other in Sekt at lunch. I did not realize the full extent of the crisis till I was on the train and learned that Germany's pact with Russia was signed and war was inevitable.

I was back again in Poland in 1948 on a lecture tour organized by the British Council and the Polish Ministry of Agriculture. I visited the notorious Oranienburg camp at Oświęcim where the Germans had done to death my old friend Professor Włodek, and I went to a number of places where before the war I had spent some very happy days. But it was all changed. Warsaw was largely in ruins and many were the tales I was told of the marvellous courage and endurance shown by men, women and children during the German bombardment when the Russians had stood by and done nothing. It is too soon to write about present day Poland, however. I still think the country will regain its liberty and that its people will once more be free to develop their great gifts. Their National Anthem, sung in days of freedom and of oppression, breathes the spirit of hope:

Poland's soul has not departed
While we live to own her; ,
What by might was taken from us
Might can yet recover.

THE LATIN PEASANT COUNTRIES

In 1935 the Portuguese Ministry of Education invited me to give some lectures in Lisbon, visit their Agricultural Experiment Stations, and go round the country with some of their experts to

discuss problems with them. The lectures were to be in French which is widely used by the educated people. Elnor went with me, and Professor Ruy Mayer, the agricultural engineer, looked after us. We were charmed with the country and the people from the outset. Lisbon is an attractive city; its people friendly and hospitable, its shops seductive, especially those dealing in gold filigree work. Taxis are driven furiously but never seem to come to grief; the barefooted fishwomen with baskets of fish on their heads evaded them with the same skill as they evaded the law requiring them to wear shoes. Peasant carts drawn by bullocks blocked the way for cars and lorries but no one minded. Life obviously flowed easily; there was no devastating punctuality to cause anxiety. It was equally pleasant in the country. Portugal has a remarkable variety of crops ranging from subtropical fruits in the south to northern European rye in the north, and including two that I had never seen before: cork and port wine. Also in the south I saw a survival of shifting cultivation: wheat was grown for a few years, the land was then abandoned and left to wild vegetation for several years, then put into wheat again. It was easy to be critical, but I had to point out that in the prevailing dry conditions methods of intensification would need very careful investigation before being widely adopted as they might easily lead to soil erosion, and in any case the first steps would be to find grasses and leguminous plants that would grow sufficiently well to provide fodder for more livestock. The farm workers seemed to live well and on the farms the daughters showed us some of their nice lace and embroidery. I liked both the farmers and the landowners I met; they were living on their estates like English country gentlemen and if there was little money there was a general atmosphere of cheerfulness and comfort.

Portugal's unique feature is the Douro Valley where, and where only, the port wine is produced that has long been an integral part of life in the older British Universities and our higher social circles. The valley is a basin of schist surrounded by high granite hills which afford ample shelter from wind, but the grapes come to perfection only on the schist and neither on the granite above nor on the alluvium below. The area is not great, the hills are closely terraced, many of the terraces were so narrow that they carried only one row of vines. There was no room for other crops

or cottages, and 'only the minimum number' of Quintas—farm buildings: the owners lived in Oporto and the workers in adjacent villages though during the week they slept at the Quintas. We stayed at one of them. Our host was the third generation on this land; the guests included other growers and also the principal 'taster' from Oporto: an Englishman, England being the chief market, though France and Norway were also buyers. We were reminded that it was an Englishman, Baron Forrester, who about 1812 blew up a ridge of rocks in the Douro and so allowed the wine to be carried to Oporto by water instead of on the bad and circuitous roads. All our talk was of port wine: not only had our fellow guests keen enthusiasm and intimate knowledge but they were true artists; to them the vine, the grapes and the wine were all living things, almost personal, and they had by long tradition acquired the artist's touch in handling them and dealing with even the minutest details. They had an intimate knowledge of the different vintages; of what had gone wrong in certain years and what had been superlatively right in others; and I felt that science could do very little here. There had indeed been some misuse of science in sophisticating bad port to make it look good, and some useful service in showing how these nefarious acts could be detected. So after our choice dinner I simply listened while these men talked, sipping the very choice wine out of beautiful glasses—crystal clear so that we could see the colour to perfection, tulip shaped and only half filled so that we could adequately savour the aroma; and we sat far into the night.

My second visit to Portugal was during the war in November 1943 when I was British delegate at an International Conference at Lisbon, and the Portuguese Ministry asked me to give some lectures to their students in French which would be better understood than English: I was also to visit the Experiment Stations and go round as before discussing problems with their experts. Agricultural education and research had considerably advanced since 1935; new experiment stations had been set up, especially the big central one at Sacavém under the directorship of Professor Antonio Camara, distinguished son of a distinguished pioneer in agricultural science, Professor Manoel Camara; on its staff were some well-known specialists including Branquinho d'Oliveira and his wife. There were advances in other directions: unemployment

was low; more fish, it was said, was being eaten as transport improved. Cod was from old time very popular: it is cut into thin slices, dried and stacked on end in the shops like gramophone records. As in other peasant countries the rate of illiteracy was high because the children could not be spared to go to school. The Government remained a dictatorship, mitigated, however, by the circumstances that there was neither capital punishment nor a Siberia and that funny stories could be told about the Dictator so long as he was not mentioned by his proper name. One of his Christian names was Antonio, which happens to be extremely common in Portugal, so that stories could always be told without risk about 'my friend Antonio'. It was said that Dr Salazar collected and greatly enjoyed them. He had certainly given a much needed stability to the regime—in the twenty years preceding his accession to power one President had been assassinated, one deposed and three had resigned—he had undoubtedly enabled a great deal to be accomplished. In any case a democracy such as ours could not function, for the peasants preponderate numerically and two-thirds of them are illiterate.

The Germans had long been making great propaganda; they were at it even in 1935, but now their efforts were redoubled. They had a beautiful bookshop in the Avenida da Liberdade, in charge of a persuasive manager and a smiling Fraulein. My host and I looked round: there had been no austerity in German book production; 'we seek a union of the spirit,' the manager explained, thinking I was Portuguese, 'and books are our best ambassadors'. Their films, too, were persuasive: German skaters doing marvellous turns, a Paris film showing what good work French artists were doing during the German occupation, etc. But they failed to make much headway: sympathy and affection for England, always latent among the people and of very long standing, were roused to great heights by the quiet bravery of English women of all classes during the bombing, and the willingness of leisured educated English women to leave their homes and work in factories or anywhere where their services were required. Mr Churchill was a universal hero, and the news of his illness in Cairo caused much consternation; a lady told me that her little girl of three asked each morning how he was, and her boy of five prayed for him daily. The British Council through their chief officer Mr

F. G. West and his able staff had quietly done much good work which was well received. 'Your propaganda is excellent,' one of my hostesses said, 'but there is not enough of it.' I explained how greatly we disliked propaganda. 'But you must do it: after all it can be cultural' (we were speaking French so the word did not seem so bad).

Some little embarrassment was caused by the circumstance that there was also a German delegate to the Conference and he let it be known that he wished to meet me and discuss the ethics of bombing (we were then beginning to retaliate). The Foreign Office however had given me strict instructions that I must have no dealings with him. It was obvious all the time that the Portuguese were comparing us in detail—much as they would have weighed up the points of two fighter bulls before a contest. Neither of us spoke Portuguese, but I scored at the outset because he would speak Spanish which they did not like at all while I spoke French, which was much more acceptable, and so I got numerous invitations which he did not. I was greatly touched by the action of the authorities and the staff of the Sacavém Experiment Station in erecting in their drive a monument to commemorate the Rothamsted Centenary and asking me to unveil it: but I was still more touched by the indefatigable kindness of Portuguese friends, especially of my host and hostess, Don Luiz Bra-mão and his wife.

The last time I saw the German delegate was at a very happy gathering at the 'Circulo Eca de Queiroz', an artists' club, including authors, artists, musicians, etc., and named after the distinguished Portuguese writer Queiroz, where after much pleasant talk we listened to Portuguese songs; then came supper and a dance, and finally the very charming leading singer invited a few of us to a smaller room where putting out all but one small light and accompanying herself on the guitar she sang us 'Fados': Portuguese folk songs, plaintive and sentimental, some of them extremely so. 'Why was I not struck blind before I saw you,' was the plaint of one heart-sick lover, 'for since I have seen you I have had no peace.' But in that place and hour and company and, the dim light, the caressing voice and the guitar were very appealing. However, at 3.30 a.m. my hostess thought we should go home and we did so.

Again I had scored over the German delegate, as he had left about midnight directly after supper, obviously not having particularly enjoyed the function.

Years after I met him in Stockholm at the International Botanical Congress and found him quite a decent soul.

While at Lisbon I received an invitation from the Spanish Government to proceed to Madrid, give lectures, visit their experiment stations and go over some of their development schemes with their experts. I gladly accepted and was given the necessary papers. At Madrid, Walter Starkie of the British Council took charge of me: having read his delightful books on gipsies I was happy to meet him and found him extraordinarily interesting, very hospitable and *persona gratissima* with the Spaniards; I was met also by two old Rothamsted men, José Albaroda and Carlos Casado, and by another old friend, D. Eladio Morales. My lectures were at the Sala de Conferencias of the Ministry of Agriculture and I had distinguished audiences including the Minister, the Secretary and our own Minister, A. F. Yencken, a gifted diplomat whose early death was a great loss to the service. The lectures were preceded by a very pleasant little function: in an ante-room the leading guests and hosts assembled to 'drink a glass of Spanish wine' and consume some delicious cakes the like of which I had not had for years. When we were sufficiently refreshed the lecture began, and if it was half an hour late no one seemed to mind.

The countryside was obviously not as happy as in Portugal. The landowners were mostly absentees and left the management of their estates to agents whose chief purpose was to extract as much money as they could from the tenants with the result that there was much pilfering and worse: there were also bandits. I was especially interested in the large settlement scheme near Seville which was on the same lines as Mussolini's in the Pontine Marshes, except that no beautiful new town was intended.

Mr Yencken was very pleased that I had so good a Press, for the Germans were excelling themselves in propaganda efforts. They had a wonderful display in a shop in one of the main streets and as most of the journalists had large families and small incomes the generous German subventions ensured high priority

for articles favourable to them. The Spaniards were genuinely afraid of Hitler: he was just the other side of the Pyrenees and could have marched in to occupy the country. There was a general atmosphere of anxiety, heightened by the enormous difference between the luxury of the great hotels and the hungry, ill-clad, discontented-looking people one often saw in the streets; it was quite different from Lisbon and a very strong government was essential.

Before leaving I had the honour of meeting the Infante Alfonso, nephew of the King, and his wife the Infanta Beatrice, granddaughter of Queen Victoria, at dinner at Mrs Yencken's house; the Minister of Agriculture, Primo de Rivera, was also there. The Infanta had a long talk with me: she had known Russia before the war and wanted to hear all that I could tell her. It was 2 a.m. before the party broke up: in saying goodbye the Infanta invited me to visit them on my next journey to Spain.

I enjoyed this visit to Spain immensely. Everywhere I met with the greatest kindness and courtesy. I nearly had trouble in getting away, however: it appeared that my visa, although issued at the Spanish Legation at Lisbon allowed me only to enter Spain and neither to leave it nor to stay. In a similar difficulty at Seville where the triptych required for local travel was deemed somehow defective (although issued at Madrid by the proper authority) and consequently the hotel could not possibly admit me, all I had to do was to leave the porter to find a solution, which he did; but here at Madrid even the porter was helpless. The hotel people were in a great state: the usual procedure of clapping me in prison was inapplicable as I was a personage of some consequence. However Walter Starkie somehow set the slow moving machinery to work and I got away in time to catch my plane home.

It was twelve years before I returned to Spain. Franco's strong government had allowed of considerable agricultural progress, the Seville settlement was prospering, and some excellent tourist hotels had been established. But the old defects still remained: the absentee landlords, who always wreck the landlord and tenant system, the intense centralization of agricultural research in Madrid when the stations ought to be in the country, and the low salaries of the senior staff which compelled them to take one or two additional appointments in order to make a living. These are

serious weaknesses and the full value of much good human material will not be obtained till they are remedied, but that would be no easy task. Decentralization in particular would be difficult: it does not accord with the system of government, and the countryside is not so attractive a habitation as the city.

We were back in Portugal in 1954 though only for a long day, but our friends were there to meet us and they gave us so warm a welcome and arranged so full and interesting a programme that it will always remain a happy memory for us. There were signs of growing prosperity everywhere we went, and the old joy of living seemed as vigorous as ever.

ITALY

Italy has long been faced with the problem of an over-flowing population and the old remedy had as elsewhere been emigration. In my first visit in 1897 I met a young postman who wanted to emigrate to England to play a hurdy-gurdy; later I met many Italians in Australia who were doing well at fruit and sugar cane cultivation. Mussolini however wished to keep more of them at home and ordered reclamation of large areas of land for this purpose. During the period 1927 to 1939 I was invited on several occasions to visit these schemes and discuss their problems with the experts on the spot.

The most interesting was the draining of the Pontine Marshes which from time immemorial had been a pestilential waste dangerous for man and beast. The work was difficult and costly in human and animal life, malaria and other diseases were rife; but in the end the waste had become a smiling tract of small farms or twenty-five to sixty acres according to the nature of the soil, with four well sited miniature towns each designed as a co-ordinated whole by a competent architect. There had been no question of cost or whether the peasants would appreciate good architecture: attractive surroundings were to be provided in which young people would grow up. The whole enterprise had been scientifically planned from the outset; surveys and experimental fields had enabled suitable cropping and cultivation methods to be devised. The soil was not particularly fertile but it responded well to phosphate and with certain limitations to nitrogen. The scientific and educational services were excellent.

The chief cash crop was wheat: the scheme was integrated with the 'Battle for Wheat' which Mussolini was energetically carrying on and which with the help of the plant breeders made Italy almost self sufficient after consumption had been reduced by using a certain proportion of potato flour in making the bread.¹ The whole enterprise was carried out by a large Government-controlled body, the *Opera Nazionale per i Combattenti*, and the cost was very high: in 1938 I was given the figure of 2,000 million lira (about £20 million at that time).—£167 per acre—but I doubted whether this was all. Mussolini controlled investment and he directed the Banks, Life Insurance Companies and others to put money into the reclamation schemes; while I admired the results I could not help feeling sorry for the clients of these various bodies.

The peasants were metayers, a system they understood, but it was modified in such a way that they would become owners of the land in twenty years' time; this ingenious system effectively bound them to the land as they could not sell their rights. For the rest they had no worries; the agricultural agent told them what to produce and how to do it, the Party agent told them what to think and say politically, and the priest gave them moral and spiritual direction. All they had to do was to obey orders, work, and beget children that in their turn would become docile Fascists. It was the perfect example of a planned and controlled economy.

The peasants seemed happy enough. They had good, well built houses, food, livestock, complete freedom from responsibility, overhead direction for everything, and the vision of future ownership of the land they cultivated—the dream of almost every peasant I ever met. The children were there too: one house that I visited—and it was in no way exceptional—was occupied by a father and a son each with a wife; they had between them ten thriving children.

Yet for all that, the Fascist system collapsed at the first shock. Years afterwards—in 1952 and in 1955—I was back again. The peasants were still carrying on, and I could not help thinking of

¹ Self-sufficiency could not be kept up however: after the war Italy became the second largest importer of wheat on the Continent, being surpassed only by Germany.

one morning in 1935 when Elnor and I had arrived at Paestum in the darkness and sat amid the ruins of the temple to watch the sun rise: presently a peasant brought out his plough and a pair of bullocks and began his day's labour much as Columella described it. Kingdoms and systems had had their rise and fall but the peasant had kept on his way, apparently unconcerned. I remembered too the drastic measures by which the Russians had tried in their own and the satellite countries to change the peasant's mentality to that of the factory worker: the terrible suffering that resulted and the small degree of success attained. The peasant system has to be improved but the methods must accord with the peasant's view of life. The Italian procedure might still have proved successful if the Party Agent could have been eliminated.

In March of 1939 I went to Libya and saw the colonization scheme there: the occasion was an international Congress of Tropical Agriculture at which Sir A. W. Hill of Kew and I were the British Government delegates. The President was Edmund Leplae of Louvain, the expert on the Congo agriculture, a man for whom I had great respect and affection. We were welcomed by the Governor, Marshal Balbo. The body of the hall was packed with black-shirted Fascists who rose as one man whenever the Duce's name was mentioned, cheering long and loudly, holding up their right arms and shouting 'Viva il Duce'; some of them stood on their seats so as to make their performance more impressive. This cringing adulation got on my nerves, there was so much of it. All through Italy we had seen this slogan painted on houses and other buildings, and here in Libya little Arab boys would come up to us saying: 'Viva il Duce, viva il Re', then hold out their hands for the expected payment. Sicily was less afflicted than any other part of Italy we visited.

I took to Marshal Balbo at once: he was very friendly toward England, and at the official banquet took in Elnor while I took in Madame Balbo; the chief German delegate was set lower down the table; at the closing ceremony after the President had thanked the Marshal for his hospitality I was put up first to continue the courtesies. Both then and on a visit to Italy in 1938 I was struck by the lack of friendship between the Italians and the Germans although they were now officially allies and we were not. At

Genoa I had asked a waiter if they were having a good season and the reply was 'No, sir, we get no gentlemen now, only Germans'. I met a number of groups of young Germans travelling on the 'Strength through Joy' programme, and on various occasions had found their conduct tactless to say the least.

In our talks about the colonization scheme the Marshal impressed upon me that it was not to be judged on economic grounds: its aim was social, demographic and political. Situated as we are, he said, in the centre of the Mediterranean and of North Africa, we are in a position to dominate the lands to the east and west of us. He clearly felt absolutely secure and he was really loved by the colonists, many of whom had served with him in Abyssinia. There was a theatrical touch about much that he did. We had brought 600 colonists with us on our boat: all carefully selected from the crowded villages of the North, passed as reliable by priest and Party Agent, and of good physique likely to produce children; they had marched on board at Genoa with music and flying banners and after a welcome from Balbo on arrival at Tripoli disembarked with even more ceremony, marching through the streets accompanied by a blaring band to the lorries that were to take them to their new homes. There each family was allotted an attractive little three-roomed house, clean and new, with the big furniture already installed; and, friendliest touch of all, a meal awaited them; afterwards they could go to look at their fields and livestock. From time to time Balbo visited the colonies and he had the great gift of making each family believe that its welfare was his special and particular interest.

The Italian colonists are confined to the coastal strip; there is little rain and they are dependent on irrigation. A survey had shown two layers of underground water, the upper not very considerable, the lower much more so; and while this water lasts the colonists are likely to thrive. Unfortunately the Arabs who were dispossessed had to move farther into the dry interior, and there was already the possibility of a struggle for water, which is always liable to be harsher than the struggle for land.

If only Mussolini could have kept himself to agricultural developments he could have effected marvellous improvements for he had the drive to get things done, he was well served by the en-

gineers and the agricultural scientists, and there was much good material in the peasants. I have seen them on the slopes of Mount Etna pounding up larva that had flowed on to their land, and mixing it with soil carried up in baskets on their heads from the lower ground in order not to lose an inch of their holding. There was much desperate poverty; many of the peasants lived in one-roomed houses without windows, air and light coming in only through the open door. Even this had sometimes to be shared with the donkey and a few chickens. And although when our hosts travelled with us they tried to hide their poverty by not having breakfast with us we soon found that while we were given 'high class bread' (wheat only), butter and marmalade, they had only the mixed wheat and potato bread eaten dry with their coffee and their chief food seemed to be spaghetti or macaroni and vegetables. Unfortunately in the tourist regions the children had become inveterate beggars, and in that glorious tract between Salerno and Sorrento it was sickening to be pestered by them, some of them beautiful as any of Raphael's angels, but whining and cringing, persistently hanging on in the hope of getting a small gift. Happily there was little of that in Sicily.

CHAPTER XVI

Food and Peasant Problems of India and Pakistan. Visits in 1936-7 and 1951

THE Royal Commission on Indian Agriculture appointed in 1926 under the Chairmanship of the Marquess of Linlithgow had recommended the establishment of an Imperial Council of Agricultural Research for India; its activities were to be reviewed by independent experts at the end of its first five years. This term ended in 1936 and the honour of making the first survey fell to Dr Norman C. Wright, then of the Hannah Dairy Research Institute, Ayr, and myself: he was to report on livestock problems and I on those associated with soils, crops and general agriculture. My committee agreed to my going and accordingly in mid October 1936 Elnor and I sailed from Liverpool on the Anchor liner *California* for Bombay. Of all modes of travel I like ships best and trains least. At Suez Frank Crowther came to meet us: he was carrying out fertilizer investigations on cotton in Egypt and told me of the great propaganda efforts of the Germans and Italians in Egypt. Nazi cells had been set up everywhere and had been helped by German successes at the Olympic Games: 'Without doubt', Frank's Egyptian assistant had assured him, 'the Germans are masters of the world'. Our passengers included a lady of the Skinner family; as a child of fifteen months she had been saved from the Mutiny of 1857 by a faithful Indian nurse who helped her mother to escape with her from prison, she being in a basket and her mother disguised as a native woman. Then there was the officer in charge of terrorist prisoners in Calcutta: most of them were students who started innocently but were inveigled by older agents cunning enough to escape, leaving the students to do the murder and bear the consequences. And there was the Indian lady, kindly, gentle, with a soft voice, beautiful eyes, wearing wonderful sarees, sufficiently emancipated to be able to travel and collect the very attractive daughter who had

been educated in England, had a marvellous time and had acquired some advanced modes of thought; she confided in me that she had read books of which I should not approve. The mother was greatly puzzled at the result of all this education for the daughter. We called to see them six months later; already ancient custom had laid its hand on the young rebel and there was now much more conformity. Also there were the very friendly Captain and officers: the engineer with whom I calculated that the ship's consumption of oil, 130 tons in twenty-four hours during which our company of 2,135 persons were carried 360-380 miles, worked out per mile per head approximately at the same rate as the petrol consumption of our modest car at home. At Bombay we were met by some old students and duly 'garlanded', a ceremony often repeated during the visit: our good friend Miss Kanga introduced us to the interesting Parsee Community and showed us some of the good work done by their public-spirited womenfolk for the improvement of the city.

. Then we went to New Delhi where we were guests first of Sir Frank Noyce and later of the Viceroy at the wonderful Viceroy's House designed by Lutyens, whom I had met at the Athenaeum shortly before leaving England. The Viceroy, whose deep interest in the peasants was already well known, was keenly interested in my visit and gave me valuable guidance. Some of the leading officials, Sir Bryce Burt, Dr W. Burns and the Council's Secretary, Mr N. C. Mehta, having discussed my programme with me, Elnor and I got revaccinated and inoculated against enteric and then started on our tour of 24,000 miles; we were to cover India from the Afghan frontier, the Himalayas and Assam right down to Cape Comorin in the far south, with divers traverses from east to west and vice versa. Our group comprised Elnor and myself, my kindly and most helpful Secretary Adviser, R. L. Sethi, through whose watchful care the whole journey was completed without a hitch; our faithful and devoted bearer, Joseph Loyal, a Christian Gurkha and a marvellous organizer of our extensive baggage who could always produce every detail of the correct array for any occasion whatsoever, who folded and tended Elnor's frocks to perfection and who at the end delivered up everything to us in perfect condition and with nothing missing; the typist Kastuni Lal; the Jemadar, a tall handsome Mohammedan, clean

shaven (though strictly speaking he should have worn a beard), gorgeously arrayed in a long scarlet tunic adorned with much gold braid, capped with a very handsome head-dress and wearing spotless white trousers; the chaprassi, also in scarlet and gold braid but less of it; these two headed our *cortège* and marked the distinction which gave our car the *entrée* to the most illustrious places; there were also the minor staff.

At the outset I had been pestered by young men of the half-educated unemployed who wanted to be taken on as secretaries or typists till Joseph undertook to deal with them. The only shortage was of teachers in the villages, but these young men wanted town posts which simply did not exist; many became politically-minded wasters. I had met a similar problem in Poland and other peasant countries: education, which seemed to promise so much, could help only the fortunate few till industry and commerce were sufficiently developed to absorb the main body.

In my enquiries I followed my usual technique. I studied the local agriculture, visiting villages, peasant holdings and larger farms in trying to put the problems into some sort of perspective. At each research centre I examined the programme of investigations to see if it adequately covered the problems; if not I made appropriate recommendations. I went carefully into the work of each member of the staff, discussing with him in detail his methods, his results, his deductions, and the next step. When a change was necessary I preferred, wherever practicable and without detriment to the end result, to amend a man's own method rather than to recommend a new one: I wanted him to get full credit for what he had done and I knew that he would put his heart better into the work if the basic idea was his own. The journey was of course strenuous, but the heat did not trouble me nor did I easily tire: moreover thanks to good staff work the travel arrangements worked well.

We began our journey in the north: in the great Indo-Gangetic plain which is the most productive part of India because it is so generously watered by its rivers and their wonderful canal system totalling some 6,000 or 7,000 miles, and also from the vast stores of subsoil water which can now be lifted by tube wells and applied to the land. Starting in the United Provinces one of the happiest districts was Meerut, where our host, the Com-

missioner, Mr P. W. Marsh, had been born and brought up and he knew intimately the people, their language and their thoughts. Among many other benefits he had secured for his chief village a tube well providing the women with water for domestic use and a tank for washing clothes, the men with a bath, and the cultivators with water for irrigating the sugar cane, their most important cash crop. During the civil disobedience troubles he had only had to say, 'Brothers, don't do it', and peace prevailed. During our journey we met other officials who like him knew the people and were well known and obviously much liked by them. But some were not so good; they believed, rightly or wrongly, that office work led to more rapid promotion. The older officials had had to travel in bullock carts doing about twenty miles daily and perforce spending days on their tour; they had time to meet the village elders and discuss matters with them. But the motor car encouraged rapid and more perfunctory visits with no time to get below the surface and gain any intimate knowledge of the people; there was always the temptation to visit the easily accessible villages rather than those more remote, and we often found that conditions were in fact better there. The wives of some of the officials deservedly enjoyed much quiet popularity, but there were others, especially in the larger towns, who greatly shocked us by their refusal to associate on terms of friendly equality with Indian ladies though these often had more education and a truer sense of culture and refinement than they themselves possessed.

On many occasions we were guests in Indian homes and greatly enjoyed these visits. After a sumptuous meal—I remember a tea with some forty separate dishes—some of our hostesses would sing Indian songs to us, accompanying themselves on a stringed instrument or a hand-harmonium. But we never quite understood Indian music. When the ladies were in purdah I was naturally excluded but Elnor was cordially received though she found their lives extremely dull. Some of the younger British officials who were sympathetic were rather lacking in social sense and committed some awkward gaucheries.

In the villages the cottages showed a general similarity in pattern. They were of one story only, built of dried clay plastered with mud and pats of cow dung stuck on to dry for use as fuel

(wood being very scarce); their monotonous brown colour was relieved by red patches, the dried saliva ejected by chewers of betel and 'pan'. The roofs were of thatch or boughs of trees covered with some protective material. Frequently there was only one room, but pillars or low partitions divided off the kitchen and store space from the living and sleeping sections. The floors were of earth but very hard and well swept. There were usually no windows or only a small hole, light and air came through the door. This frequently opened on to a courtyard where cereals could be ground and oil seeds pounded and where also the animals had their shed.

All water had to be carried from the well. Clothes were washed in the village pond except where a suitable tube well existed; the cattle also used this pond but being sacred animals were not regarded as polluters. There were no sanitary arrangements; adults paid an early morning visit to a nullah or some scrub land outside the village and the children used the courtyard or the street: one had to walk warily. In the dry season the sun speedily sterilized the excrement, but during the rains dysentery, enteric, or cholera might develop.

The villages were very compact, the streets narrow and unpaved with an open earth drain down the middle; there was commonly a central open space with a raised earth platform on which elders could sit to discuss village affairs, also a temple with some rather crude images, and a school where the children, mostly boys, repeated a lesson in a sing-song voice. The craftsmen: the smith, the carpenter and others—and the women with their spinning wheels—worked in the open, and among important residents were the moneylender, the barber—a necessity for the Hindu—who was also often the matchmaker, and the astrologer to tell the propitious days and give dates, the villagers not being able to use calendars.

Some of the villages had been tidied up by devoted missionaries like the American (but Manchester-born) Sam Higginbottom and British officials like F. L. Brayne, C. F. Strickland and others: mango trees had been planted along the road, a masonry curb set round the well to protect it against surface pollution and pits made where the village garbage could be composted. But these were exceptional, and there was always the danger that

the improvement would persist only so long as the guiding hand remained. Most of the villages were very unattractive, and I could quite understand the reluctance to stay when there was a chance of living elsewhere.

On arrival at the village we were taken to the head man, and there sitting in his veranda I would be offered bread, and, in the north, hot milk; these I must touch though I need not eat. A crowd would speedily collect: always many people seemed to have little to do. There would be some words of welcome, chanted on occasion, my questions would be answered, improvements would be explained and inspected. I found the peasants in the north very shrewd, and where they had enough food they worked well.

While much of the land was owned by the cultivators great areas were held by large landowners, the Zemindars, and unfortunately for generations there has been no tradition of country life for them. Many were absentees and sublet their land to an agent who in turn sublet it either to other agents or to the cultivator; several people were thus taking something from the cultivator without recognizing any responsibility towards him or to the land. The system could not be changed by the British Government as it had been included in the original Treaty which could not be denounced unilaterally. We met, however, some honourable exceptions where the Zemindar lived in the village, took pride in improving it and cultivating his land well, built better cottages, introduced public sanitary conveniences that could be cleaned out and generally raised the standard of life. One, a Moslem, was not only the village benefactor but its spiritual leader, and as the peasants passed him they bowed and touched his shoes to show their veneration. Others, non-resident but recognizing the ancient obligation to offer hospitality to strangers, would if they knew of our visit organize a feast and open up a bleak and obviously little used house for the occasion.

But the active improvers were rare, and we saw much poverty in the villages. Some of the district officers who knew their people well had at my request prepared typical household budgets for me. Men working as labourers were earning Rs. 5-15 a month (1 R. = 1s. 6d.). A twelve-acre holding was yielding a net annual income of Rs. 140 of which Rs. 70 represented the value

at village prices¹ of the food produced. On his free days, which were fairly numerous, the peasant could work as labourer or ply his bullock cart for hire. A poorer peasant with five acres and a family of five including the wife of the boy of twelve had a total annual income of Rs. 175 and expenditure Rs. 205: he was in debt, and so far as one could see always would be, and the debt would be passed on to the son. The family had only one meal a day and I had never seen more woe-begone faces. The Punjabis were among the best fed and had the finest physique and intelligence: indeed we found them in good positions throughout India and I thought of them rather as the Scotsmen of my youth.²

Water supply rules almost everything in India, determining the whole pattern of life: what shall be grown and how much, and whether people shall live in comfort or starve. Jute and rice are the main crops in very wet regions; sugar cane and rice, with wheat in a belt of the north, under less rainfall or with irrigation; cotton and millets in drier conditions. a

As in other peasant countries the Indian peasant was chronically in debt. A man whose total income was about Rs. 10 a month would cheerfully spend a hundred rupees or more on a feast celebrating his young son's circumcision, a wedding or a death. The custom of the caste requires it, and this is inexorable: the peasant has to borrow at 1 or 2 per cent compound interest per month from the moneylender who lives in the village, knows his financial position, takes what he can get when crops are good, and lends again when they are not. Improvements resulting from better seeds or better methods benefited the moneylender rather than the peasant and this accounted for much of the reluctance of the peasant to adopt them. Before he died the debt was transferred to the sons who thereby started life with a load they could never hope to shed. One of our landowning hostesses—a widow; at thirteen she had been married to a dissipated old man who

¹ Grain was Rs. 2 to 3 per maund (8¹/₃ lb.). One maund (40 seers) was reckoned to feed two persons for one month and one acre might give 7 to 15 maunds, feeding one or two persons for one year giving them about 2200 calories daily. Oil seeds and other foods were taken a figure of 2600 was given me as a desirable but not usually attained calorie intake per day.

² Salary levels were also low in one of the irrigation services: untrained assistants were paid Rs. 15–18 per month; field men with two years training at an agricultural school Rs. 30 per month; and college graduate inspectors Rs. 80 per month.

fortunately died after two years—kept her peasants perpetually in debt to her and so protected them against distraint by money-lenders, she having the prior claim.

Indian agriculture is terribly handicapped by the prohibition imposed by religion against killing animals. Among some communities, e.g. the Jains, this is absolute and extends even to gnats and locusts, and among a very much larger body of Hindus it protects the cow and the monkey, both being sacred animals, with the result that India has the largest, hungriest and least efficient cattle population in the world, which cannot be improved unless homes are provided for the culled animals. Nor can animal- and crop-husbandry be fused as in the Western countries—a fusion that was the first great step in increasing their agricultural output. The Moslems are free from this restriction but like the Hindus must not eat pork, and thus are deprived of the cheapest and easiest source of animal fat and protein, in both of which their diet is insufficient. Nowhere do the imponderables exert greater influence on action than in India.

The grinding poverty led to much malnutrition. The better fed peasants were consuming on the average about 1½ lb. of grain per head daily, along with milk and curd, some oil, some pulses and some vegetables. The poor ones, however, had nothing like this and their chronic hunger made food a chief interest in life. 'How many times a day do you eat?' I was often asked. 'Give me money, and I will eat for you in the name of God,' said a man going into a specially sacred temple from which I, as a non-Hindu, was excluded. Many were under-sized and weak. Assam peasants could have grown more food had they used implements like the Punjabis; but they lacked the strength to manipulate them as did their lean and hungry oxen to draw them.

Yet the peasant's life was relieved by many cheerful functions. Besides the ceremonial occasions to which he was invited there were festivals like the feast of Diwali in which we participated in Old Delhi, when good Hindus must buy new household utensils and offer rice to the god Ganesh. At night the bazaar was lighted with innumerable little lamps and candles, crowds dressed in white and coloured robes thronged the streets eating prodigious quantities of gur and other sweets; crackers were let off and children were flying sausage shaped balloons. Women in strict purdal

were carried in *purdah* chairs rather like Sedan chairs from which they could see everything while remaining invisible. More advanced young women were sitting on tables in their carved wooden balconies, their legs crossed under them; their heads uncovered, their jet black hair and sparkling eyes set off by a framework of red curtains: smiling and obviously ready to chat with passers-by. It was a noisy, orderly and very happy crowd. Then there was the *Mela*, a country fair that we attended later at Gahr Muktesar on the Ganges, to which whole families travelled for long distances in bullock waggons, doing about $2\frac{1}{2}$ miles per hour for ten hours a day. Having seen the shows one could buy pots in which to carry away the sacred water of the Ganges for use in time of sickness and of death: it may only be transported by road.

I could have written a book about this Indian journey: its marvellous sights and generous hospitality. A journey to the north-west took me up the wonderful Khyber Pass right to the gate separating India from Afghanistan and though I would dearly have loved to continue to Kabul and beyond I had no pass. Here the good road ended and the execrable Afghan road began. Beyond the gate the land was bleak and mountainous with snow on the distant heights; the only building in sight was a modern-looking house that seemed entirely incongruous: probably part of the westernizing policy that later cost Amanullah his life. The little group of Afghan guards wearing German steel helmets were placidly doing nothing; one of our guards was busily practising a stringed instrument rather like a mandolin. The tribesmen being restive Elnor was not allowed to come but made instead the attractive journey up the Kohat Pass.

At Peshawar we saw the attempts to develop fruit culture and also at Quetta where the earthquake damage of May 1935 was not yet repaired and where we were told thrilling stories of escape on that dreadful night. At Ghoom, near Darjeeling, we were received by the monks at the Buddhist Monastery. They conducted a short service for our safe return home with chanting of the prayer for all created things, ending with an outburst from their cymbals and long trumpets—so long that they had to be laid on the floor. Meanwhile we were entertained to tea in a side aisle; it was Chinese brick tea which, we were told, has to be boiled for twelve hours with salt and soda, and was then mixed with butter and

milk. It was served in beautiful little china bowls set in silver holders and was carried to us on a silver tray by one of the dirtiest monks I had ever seen; floating in my bowl were three human hairs. Meanwhile, outside, a zealot was working his prayer wheel: a bell rang each time the *Om Mane Padme Hum* was completed. He had been at it for seventeen years and had already accomplished some millions of turns: he was supported by the faithful and would go on to the end of his life.

At Calcutta we visited Sir Jagdish Chandra Bose's beautiful private laboratories where botanical research was carried on almost as a religion by devoted workers receiving only a bare subsistence salary. The place had something of the atmosphere of a monastery: 'the highest Religion and the highest Truth are the same', said Sir Jagdish, quoting an old Hindu proverb. Also I paid my respects to Sir P. C. Ray, father of Indian Chemistry whom I had met at the Chemical Society in London; he was now seventy-six and very frail. But he always had been, and he quoted O. W. Holmes to the effect that a man who would live long should contract an incurable disease in his youth and nurse himself carefully.¹ I met also P. C. Mahalanobis, then at the beginning of his distinguished career and I at once recognized his outstanding quality: so began a delightful friendship with him and his charming wife which Elnor and I hope long to enjoy. After visiting the University laboratories I lectured before the Indian Association for the Cultivation of Science, and was given the Joykissen Mukherjee medal, this being the first award. But the most memorable event of that Calcutta visit was an invitation to spend some days with the poet Rabindranath Tagore, first at his Calcutta house, including a unforgettable day on his house-boat on the Ganges; then at his remarkable University-like settlement at Santiniketan where magnificent educational work was being done, supported we were glad to think by Mr Leonard Elmhurst of Dartington Hall.

I particularly wanted to hear his views on the impact of Western Science on India's ancient civilization. He had told me he

¹ He died in June, 1944 at the age of 83. 'He was more than a great educationist and research worker, more than a deep student of ancient Sanskrit lore, more than the founder of a great industrial enterprise. He was a foe of untouchability, a friend of the village masses, a true philanthropist, an ardent patriot. His life was an example of self-forgetting service.' (*The Aryan Path*, Aug. 1944.)

could no longer enjoy his house-boat on the Ganges: the mills had wrought too great a change. Would such changes, I asked, spread to other phases of Indian life? He replied that changes must come; India must accept and assimilate Western science, or she would stagnate and perish. I asked if he feared a conflict between science and religion such as had arisen in England some sixty years ago. He said he would welcome such a conflict: it would be all to the good if a wave of negation, even of atheism, spread over the country. 'It would be like a purifying flame that would destroy the weeds and allow the Truth to grow and to spread. Truth, because it is Truth, always grows; there is an old Hindu proverb: Truth, however small, can overcome error, however great. He spoke much on this theme. The indifference of many people to religion today was, he thought, partly due to mental tiredness, which he hoped was not permanent. I asked him what he thought of the Totalitarian State such as Hitler was developing with its demand for complete surrender from the individual. He replied that States were not necessarily permanent; many had disappeared in the course of history; a principle survived only if it was true, and a nation that followed error would to that extent perish. For the same reason the idea of World Peace would spread. It was our duty, having recognized the Truth, to work for it and fight for it no matter how fearful the odds might be, and if necessary to die fighting for it. His eyes shone brightly as he spoke.

We were in the room where the Brahma Somaj had been started by his father, and Tagore was sitting on a low seat against an arched recess in the long wall; he wore a long dark blue robe and sandals on his bare feet. He was tall, fair skinned, with beautiful white hair and a long beard, very fine features, wonderful eyes and a very kind smile. He had an exquisite voice, musical, strong and clear, showing no sign of age; his whole expression was richly spiritual.

A little group of his young followers sat on the floor in front of him. As he stood up to go they knelt before him, touched his feet and left. He shook hands with us, holding our hands in both his.

With two old students, J. K. Básu and J. A. Daji, we studied the valiant efforts being made to improve the famine districts of

Bombay Presidency and Hyderabad and to cope with the soil erosion. There the chief foods were the millets and sorghums and the holdings ranged from 3 to 8 acres: the small ones could not support a family and the man would go out to work at about 5 or 6 annas a day (6d. or 7d.) Good work was being done at the Poona Agricultural College in designing better implements: a native plough, very heavy and clumsy, requiring sixteen bullocks and three men to work it, was taking three days to plough one acre, while a modern iron plough, requiring only four bullocks and worked by one man, was doing it in two. All native ploughs were not as heavy as this; I saw a cultivator carrying one on his head. But they all had this in common: that they were made and repaired by the village craftsman using local materials; he could be paid in kind and little or no money need be involved. I saw a great scope for better and lighter implements but could not see how they were to be paid for.

Among outstanding visits was one to the important research station at Coimbatore, in Madras to see R. B. T. S. Venkataraman's work on sugar cane and other crops. Another was to Coonoor when I discussed nutrition problems with W. R. Aykroyd, the leading expert on the subject. At Bangalore we were the guests of the Maharajah in his beautifully appointed Guest House. Here we visited the distinguished physicist Sir Venkata Raman; a high caste Brahmin, a tall and striking figure, impulsive, extremely vigorous, with a keen sense of humour. He had recently accepted the Directorship of the Institute of Science founded by the Tata family and brilliantly started off on its career by Martin Forster. We had a delightful evening at his house. His wife was a great contrast to him: *petite*, quiet, tactful, full of graciousness and gentle character. When a Hindu girl marries, she told me, she must henceforth be like her husband's shadow—always following: 'but', she added with a twinkle, 'that does not prevent the shadow sometimes leading'.

Mysore is a delectable State and we would gladly have stayed much longer but we were due in the tea growing districts of the hills of Travancore where our son Derek was working for a company. The planters were mostly English and Scottish, highly efficient, very sociable and with sound standards of comfort and both the wish and the means to cultivate the graces of life. They

took their trials philosophically: while we were there a wild elephant got into a tea plantation and tore up many of the bushes, another dissected by night a bridge that the coolies were trying to build by day. Panthers stole the planters' dogs, a wild boar ruined one of Derek's flower beds, and not long since a tiger had stolen a native child from the company's lines. At the other end of the scale white ants might devour one's most precious possessions. For eight months in the year there was rain and mist; mosquitoes and malaria had been a terrible scourge but the company had greatly reduced this by spraying.

At Trivandrum we were the guests of the Maharajah and I was much impressed by the keen interest he and his mother, a lady of great character, took in the welfare of his people. Greatly in advance of others he had taken a strong line about the 'untouchables' and ordered that they were to be admitted to the temples and have the images and services explained to them. The people differ entirely from those of the north: large numbers are Christians; the women go unveiled, many indeed wore very little above the waist. Education is so widespread and offers so little outlet, that graduates could be obtained at Rs. 10 (15s.) per month as policemen and minor officials. But the climate is good, life comes easily: if you owned fifty coconut trees, I was told, you need work no more.

We were taken one evening to see a Kathakali, a representation of a story from the Ramayana, the acting being by pantomime only but with a running commentary by two men chanting alternately to the accompaniment of two drums. There was neither scenery nor curtain, and the house was lighted by a single brazier with burning cotton wicks floating in oil. The actors were all men, and the acting highly conventionalized, every little movement meant something. Through no fault of our own we arrived late, but we were immediately ushered to the front and as all seats were taken chairs were handed down from the stage, at which neither actors nor audience were perturbed—a fine example of Indian courtesy.

One of my ambitions had been to go to 'Cape Comorin, the southernmost point of India, and we did; but it is a very poor affair, low lying and flat with a few outlying rocks: it simply peters out without even a lighthouse but only souvenir traders.

Back at Delhi we again stayed at the Viceroy's House as he wanted to know my general impressions. Then on the quiet journey home and for some time at Rothamsted I was putting in order my notes and the mass of documents that had been submitted to me for the preparation of my Report. I found that the scientific work was good and there was plenty of it; demonstration farms and occasional large private farms were getting yields double those of the surrounding peasants. I urged a closer link between the nutrition and the agricultural officials to ensure that so far as possible the necessary nutritive elements should be provided and I was able to make various technical recommendations for the further improvement of output. But good as it had been, the work seemed to have had little effect on the peasant apart from his adoption of better varieties of sugar cane and to a much less extent of wheat; a great gulf seemed to separate him from the agricultural research staff which I saw no way of bridging until the peasants' poverty and malnutrition could be alleviated, and above all, until the villages were made more wholesome and attractive to live in, so that men trained in agriculture became willing to take up farming instead of seeking only Government posts: the cultivators' best instructor is always a fellow cultivator who is doing better. If this improvement of village life could become a mission for India's young people India's food problem would be well on its way to solution.

FOURTEEN YEARS LATER

Fourteen years later, in December 1951, Elnor and I were back in India at the invitation jointly of the Governments of India and of Pakistan, with support from the British Council. I was to lecture at a number of centres, and to discuss the various agricultural development schemes with the appropriate authorities. The years had been the most eventful for India for nearly two centuries; they had seen the establishment of complete self-government entirely independent of Great Britain, and the separation of Pakistan as a predominantly Moslem country. At New Delhi we were again invited to stay at the former Viceroy's House, now called Government House, and used as the residence of the President of the Union, Dr Rajendra Prasad, with whom I had a long talk about the food problems. I discussed them also with the

Ministers and high officials concerned. Unfortunately the food situation had deteriorated: the population had gone up by some 40 million since 1941, the area of cultivated land per head had fallen, and there had been no compensating increase in yields. The average daily calorie intake, according to the estimates, had fallen from nearly 2,000—low enough in all conscience—to under 1,700. The 'Grow More Food' campaign, started in 1943, had given only meagre returns in spite of the good work put into it at the top level. It appeared to me another example of India's chronic difficulty: the enormous loss in effective drive in passing from the top level to the peasant. There was the further complication of bad feeling between India and Pakistan which brought thousands of Hindu refugees into India and stopped all open trade between the two countries so that India was deprived of one million tons of grain which had normally come from areas now included in Pakistan. Disturbances in Burma cut off the chief source of imports in time of need. Wheat was being imported instead; some from Australia, and it was hoped (though with some trepidation) that the United States would be willing to supply two million tons.

Great changes had occurred in the peasants' economic position. They had gathered in some of the vast sums of money circulating during the war and become for the first time free of debt—how long they would remain so was another question. Wages also had gone up: agricultural workers could get R. 1 daily, minor Government officials received Rs. 75-100 per month, unskilled workers at the mills Rs. 60 per month. The Indian Government, now dominated by the Congress Party, proposed to abolish the zamindari system and substitute for it peasant proprietorship—the ryotwari system. The wartime flush of money had enabled the millet-eating groups to purchase rice instead, and as this was deemed to be a rise in the social scale they were reluctant to go back; yet it would be physically impossible to grow rice on the millet land, and imports on the necessary scale were no longer possible. Alternative foods—hybrid maize, sweet potatoes, cassava—could be grown but were unacceptable in spite of propaganda by travelling kitchens.

Our journey was not quite as extensive as before, though, thanks to the excellent air services and where necessary the use of Gov-

ernment planes, it was more comfortable and we revisited most of our earlier scenes, omitting, however, the far south. Everywhere we had a most cordial welcome, and we were greatly touched by the kind even affectionate feeling shown towards England.

The high standard of the scientific work had been maintained and some excellent papers were presented at the Science Congress at Bangalore which we attended; 8,000 people were said to be present at the opening by Mr Nehru. I was pleased to see the prominence given to nutrition problems and to grass and fodder crops. The chief dietetic shortages apart from insufficient volume were protein, vitamin A and calcium, the latter especially in the rice regions. Sir Venkata Raman showed me his new Institute and the beautiful iridescent minerals which he was studying, especially the moonstones and the feldspars. My old teacher, Gilbert Fowler, was still living at Bangalore, and though now eighty-four years old was still actively interested in composts.

On our long journey we heard much about the rationing difficulties. The Government had at first tried to reduce the area of cash crops so that more grain could be grown, but this involved importing cotton for the mills which cost far more than the import of grain producible in the same area. So cotton was grown and grain imported and sold at less than cost price. This necessitated a subsidy and therefore rationing, which, however, applied only to the 30 per cent of the population living in the towns as it could not possibly have been enforced in the villages. The ration was low, usually 12 oz. of grain daily which was quite insufficient, and a flourishing black market developed to which even the most law abiding officials had to have recourse.

The older men frequently complained that the boasted Western enlightenment had as yet gone only so far as cheap cosmetics and sentimental films. Religion was said to be losing its hold on the younger generation, and the ban on taking life seemed to be weakening. I was assured that few were now vegetarian on principle and most people would eat meat or fish if they could get it; widows however were not permitted either meat or fat unless they remarried—which they now do, though forbidden. In some States slaughter of buffalo, sheep, goats and monkeys was permitted but not of cattle. I heard, however, of cattle being sold to Moslems who would kill and eat them, and when I pointed out

that this was contrary to religious law I was told by my good Hindu friends that 'Religion is in one pocket and money making in another'. Indeed there were some pessimists who thought that in a generation or two the cow would no longer be sacred but would be killed and eaten: I do not think that at all likely, though it would open the way to great improvements in Indian agriculture.

A serious effort was being made to deal with soil erosion and the Annual Tree Planting week was very popular. We got in for this: since its inception 20 million trees were said to have been planted in the Bombay Presidency alone. There was, however, little after-care and many of the trees died. No adequate steps were taken to interest the school children.

We saw many refugee camps: pitiful shacks of sacks or matting supported on poles; all water had to be carried, and there were no adequate sanitary arrangements. Mercifully there was no serious outbreak of cholera.

As before we were, at each capital, guests of the Governor at the Government House but it was usually shorn of most of its former glory and on one or two occasions we found little comfort and rather dreary food. I got a nasty attack of dysentery which I was told was very common: fortunately it was rapidly put right by sulphoguanidine which some of my Indian friends told me they always carried with them when travelling. One of the Governors was perturbed because the astrologers assured him a great war would start at the end of 1951 or early in 1952.

We met some very interesting people. The engineer in charge of the impressive Damodar Valley reclamation scheme, J. A. de Vajda, a Hungarian, recounted some of his marvellous adventures in the USSR where after being in charge of an engineering scheme in the Caucasus he was imprisoned and invited to confess to something he had not done and to incriminate an innocent Russian colleague. Declining to do this he was kept in an underground cell for twelve months with no glimpse of daylight and the occasional torture of very bright light flashed into his eyes. Afterwards he was put into a daylight cell. Among his fellow prisoners, as I have already related, was my old friend Lebedeff, the soil expert.

Another interesting personality was a very successful Indian

engineer, Mr G. D. Naidu, who among other enterprises also ran an engineering college at which the students were expected to be as indefatigable as himself. He would at times lecture from 7 p.m. to 2 a.m. without a break, requiring them to stand all the time and not allowing them to leave the room for a moment; he had on one occasion carried on from 7 p.m. till 9 a.m. But he claimed to give more instruction in six weeks than the Government College did in a year. In his large experimental garden he injected something into his plants which he said greatly increased their growth. He claimed that the change was permanent, and that seed for eight generations had produced similar giants. The plants were certainly very large but there were no controls and I was not sufficiently familiar with the varieties to know whether they were naturally tall growing or not. The State agricultural officers could not help me because they were not allowed to take specimens for identification: he was in any case violently opposed to the Government and he refused to divulge the nature of the injection.

I had seen other supposed marvels of plant growth in India. One man arranged a discharge of high tension electricity into his well and claimed that this conferred special properties on the water so that plants watered with it made unusually large growth. Here too the plants were certainly large but in the absence of controls I could express no opinion. Nature has so many unrevealed secrets that nothing can be written down as impossible, and the amateur may find something that the professional investigator misses. But nothing can be seriously considered without a frank and complete disclosure of all the details.

Of all the people we met, however, those that gave us most pleasure were our old students from Rothamsted, some of whom had travelled many miles to see me again. Many are now in high positions, rendering great service to Indian agriculture, and I count it a great honour to be regarded by them as their *guru*—a word which means more than teacher.

The greatest development had been the establishment in 1950 of the Planning Commission which had recently produced a Five Year Plan including a comprehensive scheme for the improvement of Indian agriculture. Thanks to the remarkable progress in engineering new machines were available for breaking up

unused land and for shifting earth, and new constructional methods had been devised which enabled schemes to be carried out that before the war would have been impracticable. So plans had been drawn up for bringing into cultivation large areas of land hitherto waste because existing power and implements could not tackle them, and for making still better use of India's water supply. I had the opportunity of discussing the agricultural section of the Plan with the Minister and senior officials concerned, and was much impressed by its scope and by the energy being put into its execution. I was also invited to take part in a broadcast from Delhi explaining why India was short of food grains and how the situation was being met.

Some of the schemes would be immediately productive: the reclaimed land could come into use directly roads were made and malarial mosquitoes eliminated, while the additional irrigation would at once put up yields. Other schemes might suffer from the great falling off in effective action between the top level and the peasant level, I saw no sign of improvement in peasant technique.

The most hopeful of all the schemes was the organized effort to raise the standard of village life and to improve the villages—which seemed to us as unattractive as ever. This was to be done rather on the line of the American Project method. I cannot think that imported methods will suffice, however; the method must accord with the psychological and emotional make-up of the villagers and this differs completely from anything in the West. I still think that the improvement of village life must be a missionary effort by India's young people, working as zealous enthusiasts, fired with love of the peasants and the land.

The most impressive mark of realism was the recognition that, even if all the schemes succeeded, the extra food produced would only just keep pace with the growing population and provide little to raise the general standard of living. So the Planning Commission took the courageous step of recommending a policy of Family Planning to which Mr Nehru finally agreed. If this can be accomplished it will be the most significant of all of India's developments.

We visited both East and West Pakistan. It was a great relief to get into the hills of Assam among the Buddhist tribes beyond

Rangamurti: clean living, simple, honest and kindly folk as yet untouched by cinemas, wireless, and other modern appliances, but nevertheless obviously deriving much satisfaction from life. Elsewhere the refugee problem was very serious in the towns, and the exodus of the Hindus had deprived the Colleges and Experiment Stations of some very competent staff which as yet could not be replaced. Difficult problems were arising on the irrigated land—on which West Pakistan is and always will be very dependent. There was trouble with India about the division of the water: with good will this could be settled. Unfortunately salt was beginning to rise and land which on my earlier visit had been carrying beautiful crops of wheat was now waste, glistening white as if covered with snow.

We were happy to get back to the North-west again: to the Charsadda district where people still talk of Alexander the Great's campaign, and we were shown date palms said to descend from those springing up from seeds of dates eaten by his soldiers; one man had apple trees whose ancestors they had also brought in. Once again I went up the Khyber to the Afghan frontier; this time Elnor came, the tribesmen being at peace. And again we visited the fruit districts only to find so little progress outside the Experiment Station that we still had to eat Cliver's jams and Australian marmalade at breakfast. The scientific work was patchy; some, however, I recommended should have more encouragement than it was getting. There was a tendency to ignore pre-partition work and to start afresh: although some of it had been very good. There was talk of nepotism, of political interference and of widespread bribery except at the highest levels, and of low standards of business morality—troubles not confined to Pakistan.

Everywhere we were cordially welcomed; in the capital cities with a military guard of honour, we being guests of the Governor, and in other places by our kindly and very friendly hosts. The Ministers were most anxious to solve their difficult problems: the food situation was better than in India, but there were refugees to be placed on the land, crops had to be improved and above all, output increased and sound soil conservation measures adopted. An Advisory Committee was being set up to plan these various activities and I was asked to remain for six months to act

as chairman: but it would have meant staying through the hot season, and we had been absent from home for some eight months; we both felt we wanted to get back so I reluctantly declined.

A considerable British community remained in Pakistan. We met many of them: all spoke highly of their friendly relations with people and officials, and although an important newspaper was violently anti-British, and a few actions had been taken like the removal of King George's statue at Lyallpur and the changes of British to Pakistani names—such as changing 'Lawrence Gardens' in Lahore to 'Jinnah Gardens'—there still remained a basal feeling of friendliness. Everywhere we met with great kindness and hospitality. At one Governor's residence our fellow guest had been the Aga Khan (though he had his separate apartments and we did not see him): when we came to leave and asked the A.D.C. what gratuity we might leave for the staff he told us the Aga had given Rs. 50,000 for charities and Rs. 17,000 for the staff (nearly £7,500): we got off however with a gift of Rs. 40.

As we were proceeding to Egypt we had to be certified free of cholera before we sailed: we were tested at Karachi, where we had been staying with our old friends Sir Roger and Lady Thomas, and passed.

CHAPTER XVII

Saving Rothamsted from the Developers The Threatened End

THESE various journeys had not only furnished a host of vitally important problems in soil and plant nutrition and given a basis of solid realism to our programme of work but they established links with the chief experiment stations overseas, and brought us a steady stream of able post-graduate workers from Universities of other countries that kept us in touch with other methods and ideas, always a vital necessity for a research station. Our staff had to be increased. Happily the newcomers were fully up to the standard of the old ones: they included C. B. Williams whom I had first met in Cairo working for an unappreciative Egyptian Government, F. G. Bawden and N. W. Pirie who gave up Cambridge for Rothamsted, F. Yates and D. J. Finney; also from Cambridge: all these in due course became Fellows of the Royal Society. This expansion was highly gratifying and splendid work was being done, but I was now haunted with the fear that the place was getting too large. Members of a research station should in my view know each other so well that each can appreciate the special skills of all the others and feel able to call on them when necessary. Nothing is worse for an agricultural research worker than getting into a groove, and the surest way of avoiding that is regular and frequent intercourse with others approaching the same or a cognate subject from a different point of view. The growth was of course a measure of our success, but I feared that it might go too far. This did not arise in my time: the war of 1939 stopped it.

We had our ups and downs, but in 1932 came a very pleasing recognition of my work by the University of Oxford. At the Encenia in June I was to be given the Honorary Degree of Doctor of Science: the other graduands were to be the Earl of Airlone, the Belgian Ambassador, the Dutch Astronomer Willere de Sitter, Sir J. A. Salter, G. Earl Buckle and W. Wilson Grey. Oxford

University Ceremonial is unsurpassed in its impressive richness of colour and dignity, and the Encaenia is one of its most stately functions. At 10 a.m. my host C. T. G. Morison took me to Christ Church to receive my cap and gown; then we adjourned to Pembroke, the Vice-Chancellor's College, to partake of Lord Crewe's benefaction of 'tates and ale'—actually choice wine and Oxford's best cakes—here too we met the high authorities of the University; then we processed to the Sheldonian Theatre, but while others entered, we prospective graduates were led into the adjoining Divinity School to wait while the Vice-Chancellor proposed to the House 'that honorary degrees be conferred on certain distinguished persons'. Meanwhile the Public Orator came in and talked to us reassuringly: he said that he would be more or less frivolous but we must not think him insulting, and certainly we must not be intimidated by him. He then knocked at the door of the Theatre to enquire if we might enter, and having obtained permission, led us in. The Theatre was packed with people; they all rose as we entered. We took our seats and were called up in order. As each of us stood before the Vice-Chancellor the Public Orator described us in Latin. He gave a very flattering account of me: 'a distinguished and not slothful aider of men', he spoke of my efforts to penetrate 'the inner secrets of the ploughed fields', my 'sound writings . . . more comprehensible by the intellect of a lover of the country than by that of a dweller in the town' and the 'easily understood and pleasant discourses in which he discusses after the manner of Anaxagoras "what makes happy crops"'. It is a nerve-racking business and although I have been through it eleven times and in four different countries, I always feel thankful to be back in my seat again. After the degree ceremony came the Crewian Oration 'in commemoration of benefactors to the University' and the recital of the prize compositions: this ended the public part of the ceremony. We adjourned to a delightful lunch in the library of All Souls, then later to the Garden Party at Pembroke College where I met a number of old friends, among them F. D. Chattaway, an old Aberystwyth student already somewhat legendary in my time: now a distinguished don at Queen's,¹ with his vivacious wife and attractive daughter. Later I went round to Jesus College to see my old

¹ He died in 1944.

Manchester colleague D. L. Chapman, now more of a recluse than ever; working quietly in his laboratory and unaware that anything was going on outside. Then back to Morison's house to change for the Christ Church Gaudy where I was at the top table opposite Michael Sadler and spent one of the most enjoyable and memorable evenings of my life.

During this period a difficult problem arose at Rothamsted which might have proved disastrous had it not been solved. One day in May 1931 I received a telephone call from the Public Trustee, the administrator of the Rothamsted Estate for the Lawes family (who had now resumed the ancestral name of Witte-wronge) saying that they proposed to sell it, including the Manor House: would we like to buy it? I answered of course 'Yes'. So we met to arrange details. The negotiations went on for months, and were not finally completed till March 1934; the price finally agreed was £30,000 and we were given seven weeks in which to raise the money. So long as the Lawes family had been in possession we were able to get on with our work in peace: we occupied a considerable part of the estate in divers places and on a variety of agreements workable only because of the goodwill of the family. But Harpenden was growing rapidly, the whole estate was 'ripe for development', and avid speculators hearing of the projected sale were already starting to measure up plots on which to erect desirable modern residences. If, as was expected, we failed to raise the purchase money. For the financial crisis was still on; there was a Treasury Ban on Capital Grants, and the Secretary of the Ministry of Agriculture, the genial and friendly Sir Charles Howell-Thomas, told me I should get nothing from the Government: 'not a bean', he said; while my City friends assured me that money was equally tight there and the prospects of help were very slender. Farmers and landowners were in at least equal difficulties. To make matters worse Easter and the Budget both fell in our seven weeks. However, I refused to despair and knowing full well that failure would cripple us hopelessly, I launched the appeal. It was well sponsored: the Presidents of the Royal Society, the Royal Agricultural Society, the National Farmers' Union, the Workers' Unions, and others, including H. G. Wells and Sir Richard Gregory, all signed it. The first two weeks brought in but little and the pessimists predicted certain failure.

Then Sir Robert McDougall read in the *Muncheſter Guardian* a paragraph commending the value of the work; he had recently ſold his mills for a very ſubſtantial ſum which he wiſhed to uſe well and after making ſome enquiries about us gave us £15,000, to which his friend Sir Halley Stewart added £5,000. Theſe handſome donations ſpeedily attracted others and the Carnegie Truſtees generously gave £2,000 which enabled us to cloſe the Fund and clear off all the contingent liabilities. We raiſed £35,000 well within the allotted ſeven weeks.

The campaign had vividly ſhown the great popularity Rot-hamſted enjoyed in the country diſtricts: the poſſibility that it might be ſwallowed by builders ſtirred up a wave of generous ſympathy. Children in village ſchools ſubſcribed their pennies (Dr Keen and I had both done a good deal of ſchool broadcasting); collections were taken from farmers on market days; a country girl marooned in ſervice in a town ſent 2s. 6d. I ſhowed ſome of theſe letters to Sir Robert; his comment was: 'when all accounts are made up theſe gifts will outweigh mine'.

After we had ſecured the agricultural part of the eſtate the Urban Diſtrict Council purchaſed the land between us and the village and made it into a public park, thus providing a permanent buffer ſhielding us from the built-up area. Unfortunately ſome of the newcomers to Harpenden lacked country manners and allowed their dogs to worry our ſheep, and after we had had to kill ſeveral ewes, heavy with lamb, to put them out of their agony, our ſhepherd, diſheartened, left us and we gave up keeping ſheep. Other farmers in like poſition have had to do the ſame. A generation has grown up that has lived only in the towns and never known the country; it has therefore not acquired the love of animals and the feeling of reſponſibility for them and for the countryside ſo characteristic of the countryman. It is ſad to think that the development of new towns in country diſtricts ſhould threaten damage to a wide belt of land ſurrounding them. Unfortunately the trouble does not end there: appalling deſtroyation of our countryside, once one of the moſt beautiful in the world, is going on, and one ſhudders when one hears of eaſier access to what uſed to be delightful places. It is difficult to controvert the charge that ſo many of the changes and developments in the countryside ſince 1914 have been for the worſe.

My next step was to provide new farm buildings suited for the new schemes of farm management that J. R. Moffatt was working out. I feared it would be impossible to provide anything quite so satisfying to the eye as the very pleasing eighteenth century buildings of the adjoining Harpendenbury farm which fitted so quietly and perfectly into the landscape. I appealed to Sir Walter Tapper: he gave us a plan for a simple and easily workable block of buildings good to look upon. I hoped the idea would spread and raised the matter with Professor Richardson: he was interested, and set 'Farm Buildings' as one of the Diploma subjects, and we invited the students to roam round our buildings collecting information. Farm buildings need not be an eyesore, and it adds little to the cost and much to the general satisfaction to have them pleasingly designed and grouped.

It was now possible also to solve an old puzzle. On one of the fields was an area in which crops would never grow well and in dry seasons the outlines of a rectangle could be seen. The Estate had not allowed us to excavate but now we were free to do so. We soon found fragments of Roman tile which I referred to Sir (then Dr) Mortimer Wheeler: he came along, decided that the site ought to be opened up and put one of his trained excavators in charge. He found that the place had been a countryman's shrine of the end of the first century A.D. when the Romans were assimilating the British gods with their own: a round central building with a conical roof like the Fortuna Temple in Rome had held the statue of the god looking out to the east. The rectangular court was surrounded by a wall of flints, with an outside ditch which we only partly uncovered; fragments of the statue were found in it but not enough to allow of identification; burnt animal bones, apparently from sacrifices, were also found. Three burials were opened up, all similar; the body had been burned and the bones put into a roughly made earthenware jar, which, with a dish of Samian ware and three small flagons, had been enclosed in a box. The wood had rotted, but the nails still remained *in situ*. As nothing more had been learned from the third than from the second exhumation I asked that the work should be stopped. Archaeology is an advancing science, and a century hence it will be good to know that much of this site is still undisturbed.

When we acquired the Manor House it was occupied by a tenant;

at her death it was taken by the Army and in spite of a strong and sympathetic colonel suffered great damage by the troops; in the end (which came after my time) the Government paid in compensation nearly three times the sum we had given for the house and my successor obtained a further grant whereby it was transformed into a much needed hostel for the staff and post-graduate research students. The house goes back at least to the sixteenth century, and its beautiful Jacobean front and lovely paneling and fireplaces make it a joy to live in quite apart from its association with Lawes.

Meanwhile the growth of the staff continued and the laboratories were badly overcrowded; they needed remodelling and considerable extension. The Ministry of Agriculture was not prepared to make a grant and we should have to raise the money ourselves. The fact that our centenary would soon be upon us gave an attractive title to our appeal: the centenary would arouse widespread interest and, I hoped, considerable financial support: we wanted £125,000. The appeal was inaugurated in the rooms of the Royal Society by the Duke of Kent on November 1st, 1938; it speedily brought in £31,000 and more followed; the building programme was at once started and went forward so well that we had finished the main items before the war brought all such work to an end. Prices rose, however, as we proceeded, and in the end the Ministry had to help us with a grant of £210,000 due entirely to the circumstance that the war stopped our collecting activities. In due course we got our laboratories, pot culture and glasshouses, farm buildings and cottages completed on a scale that would allow for expansion for as far ahead as it was then possible to foresee. For years I had been quietly purchasing adjoining land, houses, cottages, and frontages so that we finally had the freehold of a well-rounded estate of some 540 acres.

The land and buildings were thus assured but I was very unhappy about the financial position of the staff. They had come to us full of youthful enthusiasm and had done brilliant work, but the financial arrangements made by the Ministry of Agriculture were inadequate and dispiriting. I had considerable correspondence and numerous interviews with the officials and doubtless became rather a nuisance to them but I felt very strongly on the matter: the staff had given generously of their labour but their

remuneration had been very niggardly. Civil servants are not really suited for financial control of a research institution, and in due course the problem was handed over to the Agricultural Research Council; satisfactory arrangements were finally made. I had always felt a great responsibility for the staff, and was most anxious that each should have the fullest opportunity for advancement and for leading a satisfying life.

In July of 1939 the Royal Agricultural Society celebrated its Centenary and held its Show at Windsor. I was included among those whom the King honoured with an invitation to dine with him at the Castle. A little later I started for Russia.

Early in September 1939 war broke out. It had long been feared but we had hoped that the appeasement policy of Mr Chamberlain would have averted it. The British Association had assembled at Dundee and as I have already related I was due to give one of the Citizen's lectures—otherwise I should have been trapped in Poland. But the blow came on the second day of the meeting and we hurried home to prepare for the worst. For a time little seemed to happen but as the food production plans emerged they were seen to be very different from those of the first war. The agricultural situation had changed. Practically all farmers were now in the National Farmers' Union, and the County Branches were very strong. The Government Advisory and Educational Services were well developed, also on a County basis. Instead therefore of setting up a Food Production Department each county was allotted a quota—target was the favourite word—and given the means to achieve it. As the Research Institutions were not associated in any way with the counties they could not readily be fitted into the scheme, much to the disappointment of the staffs who had been reserved—a great improvement on 1914—and who wanted to participate actively in the work. For some time the practical men were in control; no meeting of the Directors of the research institutes was called to discuss problems or formulate plans. In the end the Agricultural Research Council took charge of the scientific work and when they wanted anything done they applied direct to the man they had selected instead of to the Institute. Before long practically all the Rothamsted

staff were engaged on war problems, several under bonds of secrecy, so that no general discussions were possible. During the interval of waiting I urged the staff to complete as quickly as possible the pre-war research work so that the benches could be cleared for the wartime problems and we should not have to suffer the grave losses due to unpublished work to which Research Institutions are peculiarly liable. In association with D. J. Watson and H. V. Garner I brought together the results of our long-continued field experiments on wheat, barley, mangelworts and potatoes, so that whatever information they might yield would be readily accessible. I wanted to complete the set by including the experiments on grass but got caught up with other work.

When the Ministry of Information was set up the Minister, Mr Brendan Bracken, invited me to join it on a half-time basis as Advisor to the Soviet Relations Division and with the consent of the Ministry of Agriculture I did so, staying half of each week in London alternately at the Athenaeum and in chambers. I saw a good deal of the Soviet Ambassador, the very shrewd and able Mr Maisky and his charming lady, and on various occasions enjoyed their sumptuous hospitality at the Embassy: I remember in particular one function when I was put in charge of Lydia Lopokova. The work at the Ministry brought me in contact with some very delightful people. Dame Myra Hess over a cup of tea in my room told me the fascinating story of her lunch hour concerts and how they had confirmed her faith in the deep feeling for good music possessed by the ordinary London citizen—which the post-war years have abundantly proved. With characteristic generosity she had given a number of talented musicians their first chance to appear in public. One of my well-meant efforts to help proved a failure. I collected £50 to purchase a suitable violin for a very promising young Polish refugee; with a fine gesture he refused it as he could not accept money from people he did not know. The artistic temperament is hard for a science man to understand.

My London work was soon extended: I was appointed chairman of the Agricultural Committee of the Allied Post-war Requirements Bureau; our function was to draw up lists of what the allied occupied countries would need for restarting their agriculture with the purpose of obtaining these things *en bloc* thus

avoiding devastating competition between themselves. Each Allied Government appointed one or more of their members as delegates, and I saw a good deal of their Ministers. I enjoyed this work very much as I had personal knowledge of most of the countries and their agricultural conditions. Some of the Ministers impressed me considerably, especially Mr Mikołajczyk, the Polish Prime Minister, whose small farm I knew, Professor Bičanić, the Yugoslav economist, and Dr Krolikowsky, the Polish economic expert. Later the Committee was reconstituted as the UNRRHA Sub-Committee for Agriculture for Europe, but I retained the chairmanship till it was transferred to Washington, that being necessary because the stockpiles were being built up in the United States.

Fortunately I escaped the worst of the London raids though Elnor and I used sometimes to go on to Harpenden Common at night to see the glow in the southern skies when great fires were raging in London twenty-five miles away. After one of the worst I spent a morning in the City talking to people there. 'Can you stick it?' I asked them. Waitresses, lift-boys, business men standing in the doorways of their ruined shops and offices, and clerks working amidst the wreckage as if it was their normal environment, all gave the same answer: 'Of course we shall.'

A flood of refugees came to Harpenden and we took into our house a woman from North-East London and her two children. But they could not stand the quietness, the lack of fried fish shops and similar amenities, and went back as soon as they thought it safe. Then, too, Harpenden people learned with amazement how utterly ignorant many of the children were of the most elementary notions of religion, conduct and manners, and how completely they lacked house training, so that we wondered what London school teachers had been doing all those years.

The war brought our fourth son Derek back to England. He had been studying at the Queensland Agricultural College. At the outbreak of the war the whole class volunteered for the Australian Imperial Force though none of them need have done so. But England was in danger. His regiment was sent here to deal with the expected invasion. He spent his leaves at home and we were very pleased at the way he had developed. When no invasion came his unit was drafted out to the Middle East and he went

into action against the Vichy French Forces in Syria. He was wounded and with a few companions cut off for several days with no medical help. Finally he was taken prisoner and carried to the Beirut Military Hospital, where he was nursed by the Sisters of Mercy with the greatest kindness.

But it was too late. He was buried in the Military Cemetery there. Years afterwards Elnor and I visited it and we were grateful to those who had laid it out so beautifully and kept the graves so well. It was sad to see so many graves there, and sadder still to think that those young lives were cut off by the French who but a short time before had been our allies.

In May 1943 we celebrated the Centenary of the Rothamsted Experiment Station. The losses and anxieties of the war necessitated a high degree of austerity but a large and distinguished company, representing the leading scientific and agricultural organizations of some twenty different countries assembled for the occasion; fortunately the day was fine and laboratories and farm put up some splendid exhibits, giving the day an appropriate brilliance and impressiveness. As I showed the Minister and some of the guests round I felt a great glow of pride that I had been able to effect so marked a transformation in the thirty-one years during which I had been in charge: farm and laboratories changed out of all recognition, the estate secured permanently, allowing abundant scope for further developments and, most important of all, a loyal and enthusiastic staff of international repute for their scientific achievements and the promise of even greater things to come, while our subject, so small and unimportant in 1901, had developed beyond my most sanguine expectations. I handed over to my successor, Dr W. G. Ogg—later Sir William—an institution very different from the one I had inherited.

It was however a sad time for me, as I was now in my seventieth year and was due to retire in a few weeks time. This meant giving up not only my work but our home as well, for it was an official residence. Twenty years earlier Elnor had designed it jointly with the architect and I had collected the money to build it; we had made the garden and watched it grow in beauty: it had become part of our lives, but we had always known we must give it up. We had no idea where to go: I wanted to continue working



•1 Rothamsted laboratories in 1907 and in 1949

(Photo R H I Bradley)



but I felt it would be best to leave Harpenden. We thought of London but only for a brief moment; we both wanted to be in the country; finally we decided we should be within reach of Oxford or Cambridge where we had many friends and where I should be able to get such help as I wanted in my work.

I was so heavily occupied that the business of house-hunting fell entirely on Elnor. It was our first experience of this problem. At the outset it seemed so simple; various house agents assured us that they had exactly what we wanted: small Tudor or Queen Anne residences of surpassing beauty, ideally situated in delightful surroundings and fitted with every modern convenience. Elnor set out to investigate but was quickly disillusioned: we soon learned that a house agent's claims require to be heavily discounted. Many fruitless journeys she made and returned home weary. Then, when we were beginning to get anxious, fortune smiled on her. She had accompanied me to Oxford where I was lecturing and after refusing the proffered 'desirables' as being quite unsuited asked a policeman if there was any house agent she had not yet consulted. She showed the list, and he replied: 'Yes, madame, there is one just opposite.' She went; he was apparently only in a small way of business and he was out; she went again and found him in. He had only one possible house but though the owners were anxious to sell it they did not wish to advertise for fear it should be requisitioned. So, unlike all his predecessors, he dropped all fulsomeness and came straight to the disadvantages, a lonely situation and proximity to an aerodrome. She saw it and fell for it at once. Small, well built, in grounds of ample size for us, an island site shielded from the noise of the road by a wide surrounding belt of woodland. I saw the house and liked it immensely and thought the aerodrome would probably not survive the war (nor did it) so we proceeded with the purchase. When the final parting from the old home came we felt less heavy-hearted than I had feared. It was forty years almost to the day since we had gone to our first home at Wye, wondering what the future might have in store for us, and we were once more starting out into the unknown. We were going alone, for our children had left us: both daughters were married; Walter became Reader in Soil Science at the University of Oxford and later Director of the East African Agriculture and Forestry

Organization in Kenya; John, after seeking various ways, had found his path at last and became a Jesuit priest, lecturer in philosophy at Heythrop College; Hugh became a doctor at Norwich.

The staff gave us a magnificent send-off. They organized a party at the Public Hall; with wives they now numbered some 300. As I watched them assemble I thought of our first parties at the Laboratory when we were few and all young. The intervening years of growth and action had been supremely happy and I had become deeply attached to the staff, both scientific and assistant.

As a more permanent gift the present and past staff subscribed to have my portrait painted by Francis Hodge. I greatly enjoyed the sittings. He occupied Alfred East's old studio in Chelsea and was full of stories of Whistler and other great Chelsea figures and modern leaders in the Art world.

Other honours came as well. The Royal Society of Arts awarded me the Albert Gold Medal, their highest distinction, and inscribed it 'For researches and leadership in agricultural science and services to husbandry in many lands'. The two previous recipients had been Field-Marshal Smuts and Mr Roosevelt; two years later the King accepted it: my name stands in good company on the board. Another tribute that afforded me much pleasure was the issue for my seventieth birthday of a special number of the Journal *Plant Physiology*; my American friends also sent me an attractively bound volume of letters which they had written me and which touched me greatly. I felt indeed that though I had never been a collector of honours I had received more than my share of them; besides my honorary degrees I had been elected an honorary member of many scientific academies in Europe and the Empire, and in addition to the Albert Medal I had been awarded the Messel Gold Medal of the Society of Chemical Industry and the Joykissen Mookerjee Gold Medal of the Indian Association for the Cultivation of Science. Later on the Paris Academy of Sciences, of which I had long been Correspondent, elected me a Foreign Associate.

For nearly a year all went splendidly. Woodstock and its neighbourhood proved most attractive and we soon found delightful friends. Some, like ourselves, had led busy lives and come

here to retire, replacing an older generation of minor gentry attracted by the proximity of Blenheim Palace which had in living memory been a great centre of hospitality. Some of the older inhabitants disliked the change: 'There are no gentry here now,' said the lady who came to 'oblige' for us, 'only people that have got on.' Although Woodstock is our postal address we belong geographically to Bladon, a friendly, chatty little village of which we became very fond. It is old, and proud of the fact; it figured in Domesday when Woodstock was but a Royal Forest. Its church is the mother church while that at Woodstock is only a chapel 'in the Chapelry of Woodstock'. Of course we shall never be real Bladonites, birth alone gives that distinction. But we all know each other, and greet each other with a smile and a kindly word when we pass in the village street, while a visit to our tiny post office or our little shop with its amazing assortment of commodities has something of the character of a social call.

Oxford was very hospitable. The President and Fellows of St John's College kindly invited me to join their Senior Common Room; this gave me the privilege of dining with them in Hall and then adjourning to the Common Room for coffee and wine and that delightful conversation heard only at an ancient University that has kept up its traditions. I had standing invitations to dinner from friends at other colleges and should speedily have widened my acquaintance. I was already an Honorary Doctor of Science of the University.

The Ministry of Information released me from regular attendance at the Office but I had to be in London for UNRRHA Committee meetings and other activities: among them overseas broadcasting to some of the Resistance Groups and a lecture to Dutch students who had struck against Nazi domination of the Dutch Universities. During this time I was also a member of Council and Vice-President of the Royal Society, of the Royal Society of Arts and of the Royal Geographical Society which conferred membership of its very friendly Dinner Club; at these various gatherings, and at the Athenaeum and other great clubs I met most of the men who were doing big things in those days. In the winter of 1943-44 I visited Spain and Portugal as already related and came home to a very busy life: my programme was to include some educational work among the navy

in the Orkneys and Shetland, some important discourses, broadcasting, and in my spare time, writing.

Then with dramatic suddenness came the collapse of all my schemes. For some time I had had trouble with my teeth and was advised to have them out: I was to go into a nursing home for five days, after which all would be well. So at the end of August 1944 I went. The war was at its height: many doctors and nurses were away. Somehow something happened, and I got serious septic infection. I went home but after a few days had to return to have the prostate gland removed. This was to take a month but afterwards I should find myself stronger and better than before. Within three weeks, however, I got septic phlebitis and was not expected to survive. But I did so, and after about six weeks returned home almost a wreck and in constant pain, suffering from some obscure trouble in the back and abdomen which could not be diagnosed and therefore had to be treated by methods of trial and error. I thought I was getting better and set out to fulfil lecture engagements in North Wales and Dublin. On the way I collapsed. The very competent physician—Sir Edmund Spriggs—at whose house providentially I was staying had an X-ray photograph taken of my spine: to our relief it showed no disease. I was apparently suffering from lumbago and neuritis; he patched me up so that I could return home where I was treated accordingly. But the trouble got worse and he wrote advising me to see the Oxford nerve specialist Mr Pennybacker who had another X-ray taken, this time higher up the spine. The result was disconcerting, there was definite erosion of the vertebrae and it was continuing: already there were signs of incipient paralysis. The earlier photograph had missed the diseased spot by a short distance and so had thrown us off the track. I was sent to the Wingfield Orthopaedic Hospital under Mr Foley who had me immobilized in a plaster bed for nearly ten months. Thanks to the highly efficient nursing staff—especially Sister Masters—I was soon free from pain for the first time for many months. Before long the erosion ceased and the building up process began. But it was slow.

And so the five days in the nursing home dragged on to an illness of two and a half years which I felt all the more keenly because it was the first time that I had had to remain for long in bed. In addition I had broken my professional connections.

However it was not all lost time. I read many books that had long been on my waiting list, improved my Russian, did much writing, reviewing, etc., had visits from many friends and received much kindness from the staff. And I greatly admired the courage and the fortitude with which the young people went through with their treatment. A young girl, attractive and with great social gifts, had to lose a leg, but she did it with a smile. Others would lie month after month without repining, some would practise handicrafts, others read or studied. Where one might have expected sadness and gloom there was an atmosphere of cheerfulness and even gaiety. There is much quiet heroism in this generation that is growing up.

When finally I was taken out from my plaster mould I could neither stand nor walk: both arts had to be learned anew. Finally in May 1945 I was fit to leave the hospital. Before I did so my wife was warned that I should probably always be a semi-invalid, I might potter about in the garden but could not hope to do more. I should report periodically to the hospital. It seemed to be the end.

CHAPTER XVIII

The Threat Averted *A New Lease of Activity*

I had no desire for the life of an invalid and I wanted to get back to work again but was not yet ready. The rest of the summer was spent in my garden reading Pushkin, Turgenev, George Duhamel, Thomas Mann and Richard Bach in their own languages. Then when the winter came we spent ten weeks of its worst period at Torquay; we had intended to stay only four weeks but the heavy snow storms of February 1947 had blocked the roads so that we could not get back. I had never before seen snow on palm trees nor do I ever want again the pathetic sight of beautiful red-wings, migrants from Scandinavia come to Torquay to escape the rigours of its winter, caught by the snow and being swept up dead in heaps in the public gardens. Meanwhile I was steadily becoming more mobile: I walked first with two sticks, then with one, then with none. The summer of 1947 passed peacefully at home and work began to come in once more. Finally came the cheering news after a hospital visit that, contrary to all reasonable expectation, the X-ray photographs showed a complete rebuilding of the eroded vertebrae, and I need go back no more, nor need I confine my activities to pottering in the garden. I did in fact go back some months later, but it was to be inoculated against Yellow Fever because I was off to Central Africa.

Soon came the opportunity for a trial run. In the autumn of 1947 the Gilchrist Trust invited me to give a series of lectures in the North and I accepted with the greatest pleasure. To my regret Rudsey was not included in the itinerary: it would have given a sentimental touch to have recalled Robert Balf's Gilchrist lectures there to which I had listened as a boy. But Padiham was included, and my old friend George Waddington, whose leisure had for years been devoted to public service, moved the vote of

thanks in a speech recalling many incidents of sixty years ago. It was an added interest to stay at Read Hall on which in my youth I had often looked with admiring eyes, though I had never got nearer than the Park gates: my kind hostess, Mrs Hindley, took me in her car round Pendle Hill revisiting some of my old favoured haunts and her son showed me over their mill a wonderful change from those I had known in the 1890's.

The audiences were good and appreciative as ever, but there were fewer young people than I expected. The only explanation I could get was that young people wanted films rather than lectures. My lantern slides, admittedly good and some even beautiful in addition to serving their special purpose, were nevertheless static, and could not compete with something that moved. Tastes change: for years I have regularly illustrated my lectures with lantern slides, but I get the impression that audiences are no longer keen on them so I now usually dispense with them.

I thoroughly enjoyed the tour: it was strenuous, but it showed me that I could fully resume my old activities. This was fortunate, for the succeeding years were very full. There were two great events in 1948. The British Council asked me to go to Poland to lecture at various centres, and the Polish Minister of Agriculture invited me to visit the Experiment Stations and discuss problems with the staff. I accepted with alacrity, delighted at the prospect of seeing those of my friends who had escaped the horrors of the war and the occupations. It was a great joy to meet them again and I was full of admiration for their courage and endurance: I have in an earlier chapter written all that I can at present.

But the greatest event of that period, indeed one of the greatest of my life, was my election as President of the British Association for the Advancement of Science, one of the highest honours open to a British scientist. It came as a complete surprise and the pleasure was enhanced by the circumstance that for months the nomination had to be kept secret: the election is by the General Committee which does not meet till long afterwards, and although in fact it has always accepted the Council's nomination it would rightly resent its acceptance being regarded as purely formal. I chose, as the subject of my Presidential Address, World Population and World Food Supplies about which I had been

collecting material for many years: it had been constantly in my mind in all my agricultural journeys.

The meeting was at Newcastle-on-Tyne, a city equally famed for its industries, its culture, and its hospitality: and in September 1949 it was decked out with flowers. The friendliness of the welcome given us by its distinguished Lord Mayor, M. A. C. Curry, the Lady Mayoress, Alderman V. H. Grantham, who later became High Sheriff, the Chancellor of the University, Lord Eustace Percy, extended through the whole community: it was one of the happiest weeks of my life. The impressive ceremonial of the inaugural meeting at which the Honorary degree of Doctor of Science of the University of Durham was conferred upon me set the standard of dignity for the whole proceedings; at the end we felt that we had rarely had a more friendly meeting.

I had heard a good deal about the unfortunate experiences of some of the African and of the darker Indian students in certain colleges, especially in London, and I wanted to learn how they fared at Newcastle. So I invited each of the groups to meet me separately. I was particularly pleased to learn that they were having a very happy time: there was absolutely no colour bar, students and citizens alike had shown great kindness, the staff of the British Council had helped them in many ways and some of the churches, notably the Brunswick Methodist Church of which Rev Dr Leslie Newman was pastor, had organized regular social evenings which had made them feel at the outset that they were welcome guests. I had taken this step because a few weeks earlier, returning from a delightful holiday in Sweden with a group of the Le Play Society, I had met on the boat a sorrowful group of African students of one of the London colleges who told me of their unhappy experiences there, of inconsiderate treatment by landladies, hotel keepers and others, which they greatly resented. I wrote to the Colonial Office about it and they replied that hospitality in London was almost impossible to arrange except for students in hostels owing to their very wide scatter: I could of course see the difficulty. I enquired later at Aberystwyth, Bristol and Oxford: in all of these Universities the African and Indian students were settled happily with no suggestion of a colour bar: both in Bristol and Oxford the British Council staff were extremely helpful.

As there are some 10,000 Colonial students in Great Britain a considerable number must be placed in London, and it is most unfortunate that sufficient hostel accommodation is not available. Many of these students come with high expectations and with exalted ideas of what English people are like, they having met only the very good types that the African services still attract. If they can return home with these happy ideas confirmed they will be potent missionaries for maintaining friendly relations with this country. But if they are slighted, or made to feel unwanted, still worse if they feel they have been insulted, they may return with bitter feelings and cause endless trouble. A Swedish girl staying with us got into conversation with a West African student in London and he opened out his heart to her: 'I hate these English,' he said. 'I owe everything to them: my education, the amenities of my home, our civilization; they have spent large sums of money on me and my friends, but they despise us and hardly treat us as human beings. I hate them and when I get back to Africa I shall do all I can against them.' What had caused all this bitterness Sigrid could not discover, but some of the accounts given me by African students of their treatment in London have been deplorable. Happily these cases seem to be exceptional. Personally I never lose an opportunity of getting into conversation with Indians and Africans whether on railway stations, in trains or elsewhere and have had some pleasant talks in consequence.

Soon after the Newcastle meeting was over Elnor and I proceeded to Austria at the invitation of the British Council and of the Austrian Ministry of Agriculture. I was to lecture at a number of centres during the month of October, and to visit their experimental farms and others of special interest, discussing problems with the people concerned. We were still technically at war with Austria, and our troops occupied a considerable part of the country: we should have understood a cool reception or even some hostility. But rather to our surprise we everywhere received the warmest welcome and the friendliest of greetings: the occupation was regarded as a regrettable necessity and our efforts to make it as light a burden as possible, and to avoid anything that might hurt the national susceptibilities, were greatly appreciated. The Russians on the other hand were behaving atrociously both to the Austrians and ourselves. Wherever we went farmers

complained of the damage they had done: stores of wine in the grape growing districts had been completely emptied except where the owners had succeeded in hiding some special vintage. In the good houses in Vienna priceless furniture had been ruined, valuable Persian rugs had been cut into strips to make seats more comfortable, and old tapestries had been wantonly bayoneted: repairs would take months. One of the city squares had been renamed Stalin Platz and a grandiose memorial to the Unknown Russian Warrior had been erected blocking a fine vista through a park with a palace in the background. In the country we heard the Russians compared to locusts, the memorial was to the Unknown Russian Robber. The thing that particularly rankled in one village was that they had used hand grenades to kill the trout in a good stream so as to secure them more easily: this had of course proved ruinous for a time though there was hope of recovery. They imposed a number of senseless and irritating, even humiliating, restrictions. It was not permitted to walk on the pavement in front of the Russian Headquarters in Vienna; one had to step out on to the road. The British personnel were refused permission to run out from Vienna during the hot summer except along one narrow corridor; permission was also refused to pass by train across a strip of the Russian zone with the result that a British concert party had to make a fatiguing detour taking twenty hours to reach their destination, instead of the three or four hours of comfortable travel otherwise possible. There was widespread fear that their depredations would not end with the occupation and they would retain possession of such resources as they could. They certainly are building up for themselves a legacy of hearty dislike and even worse. I write this with all the more regret because they gave Elnor and myself the passes necessary to visit the districts we wanted to see, for which of course we were duly grateful. We saw some beautiful places in the Russian zone, especially the Monastery of Melk which had preserved its library treasures intact because the librarian with his flowing beard had so benign and priestly a look that the Russian soldiers feared to disturb him. Another attractive village in the Russian zone, and one to which we hope one day to return, is Dürrenstein, beautifully situated in glorious country and dominated by the ruins of the Castle in which Richard I was imprisoned. But it was

Blondel rather than Richard that seemed most to appeal to the local imagination.

We started from Innsbruck and travelled by car over most of the provinces. In the Tirol we were impressed by the permanence of the peasant way of life. One, who had a large and beautiful house, spotlessly clean and polished, showed me his pedigree which went back to the time of the Emperor Maximilian (d. 1519). Another also claimed that his family had been in possession for 400 years. His farm lay high and had hardly any level land: the Agricultural Chamber had lent him a tractor so that he could haul his implements up the slope and so cultivate up and down; life was hard for him and his wife, and his children had a two-hour walk to school each way. After the usual greeting 'Gruss Gott' we were invited to join them in their meal: milk, bread, a great lump of butter—finger thick, we were told, it should be spread, but we could not manage that—and honey: all produced on the farm. They had, however, little meat, eggs or vegetables, but plenty of wild berries from the forest. Like other peasants that we met, our host had no intention of giving up the ancestral land: over one farmhouse door we read an eighteenth century inscription which still expresses the peasant's attitude:

Was der Ahn erbaut
Und uns hat anvertraut
Wir wollen es ehren
Mit Gottes Hilfe mehren.

'What our ancestor set up and entrusted to us we will respect and with God's help increase.'

Throughout our journey we found a prejudice against potatoes because they reminded people too much of the war; and against vegetables, because the Germans, whom they now heartily disliked, had insisted on their inclusion in the diet on nutritional grounds. Talking to the peasants was sometimes difficult because many of them spoke only their valley dialect, but always some could be found who spoke German.

From the Tirol we traversed Salzburg province and passed on to Styria, calling at Salzburg itself to wander through its fascinating passages and at Wels to see the wonderful Spanish horses—the Lippizaner—who were put through their steps to show us

what they could do. We visited some very prosperous peasants and had some marvellous well-cooked meals of ham; sausage, schnitzel, gorgeously rich *Torten* and fruit: it was the pleasing custom that you could ask permission to carry away any of the food that remained uneaten, and it was to our hostess's evident satisfaction that Elnor on one occasion asked for some of the *Torte*. All was home-grown, the cider home made and the schnapps produced from damsons. The prosperous peasants lived well enough but the poorer ones had little more than dark bread, soup, cider and, two or three times a week, some smoked pork; no butter, cheese, tea or coffee. Eastern Styria we found particularly delightful: the plains well cultivated with maize now ripe and brown—much of it the modern hybrid sorts, one of America's great gifts to the world—buckwheat, rape (bright yellow in full flower), for oil seed; the southerly and eastern slopes in fruit or vines; the northern and western in grass or wood, and the summit crowned by an imposing castle or ecclesiastical building. Some of the little towns were very attractive. Arriving at the Yugoslav frontier we saw how strict a watch was necessary to prevent its citizens escaping from the joys of Communism: a wide belt had been cleared through the forest along the frontier, soldiers were hidden among the trees and shot anyone attempting to cross. All the same some did get across, and even more escaped from Hungary: they did not stay in Austria but moved westwards, usually to the United States. The Gaultz wine area pleased us greatly. If I had to live on the continent I should prefer Styria to most other places.

Hitherto I had been visiting farms, peasant holdings, and agricultural schools; we now had to go to Vienna where my lectures were to be given. We stayed at Sacher's Hotel, formerly reserved mostly for Grand Dukes and such people in the days when it was run by Frau Sacher, the forbidding-looking proprietor, sitting in the Hall with a bulldog and smoking a big black cigar. It was now run by our military authorities by whose courtesy Elnor and I were allowed to use it. Vienna pleased us greatly. The city itself is not very noteworthy, there had been much bomb damage and heaps of rubble still lay untidily about: Elnor found the shops very dear. But the people are really remarkable. They had been dragged into a war from which they had not the slightest pros-

pect of gaining anything; they had lost, and for years their country had been occupied by foreign troops, one set of which was definitely hostile, yet they still retained their cheerful outlook on life, their love of music, especially that of Mozart and Strauss, and their appreciation of choice food and wine. The famous Opera House had been bombed, but it was being rebuilt; meanwhile Mozart's operas were being performed at the old theatre where they had first been given. The conductor was Josef Krips: we were taken to his room during the interval in *Il Seraglio* and had a chat with him; he was well pleased with the musical team he had been able to assemble in spite of difficulties; he was hopeful also that the new Opera House would be acoustically as good as the old one. He had recently returned from a cure and had lost some 35 lb. weight; he was feeling all the better for it and was in cheerful mood. During the performance I sat next to a Hungarian girl who had just escaped across the frontier; it was costly but not too difficult. At one place a local train brought unemployed Hungarians each morning into an Austrian town just over the border to work; it took them back at night, hostages ensuring that all returned. The agents arranged with the guard and engine staff that it should slow down at a spot between the last control point and the actual frontier; she had lain hidden in a bush all night with only a handbag and an umbrella, then she heard the distant rumbling of the train, saw its lights, ran up to it as it slowed down; in her excitement she missed her footing, fell and hurt her foot, but made a brave attempt to recover and got on. She was passionately fond of music and had spent some of her very slender stock of money to come to this performance. She hoped finally to get to the United States where she had friends: I liked her very much but never heard whether she succeeded or not.

• My lectures were given at the *Hochschule für Bodenkultur*. I had prepared them in English but on arrival at Vienna was asked to give them in German. My programme was so full that I could not possibly translate them myself, but the British Council arranged for this to be done and my old friend Dr. Frauendorfer, with whom I had worked in Rome, checked the technical terms. There is more formality about a University lecture in Central Europe than here: the Rector is addressed as 'Your Magnificence'

and one goes on 'Honoured Colleagues, Ladies and Gentlemen'. The lectures were well received and I enjoyed giving them. At the end the Rector informed me that the Honorary Doctorate would be conferred upon me on the next Degree Day, in the following May. Unfortunately I could not then attend, but a representative of the British Embassy went in my stead and duly received the document.

I spent some time in the laboratories and experimental grounds and was much impressed by the way in which wartime difficulties were being overcome. The main soil problems, deep ploughing to break the plough-sole, mole draining and suitable rotations, were being studied by Professor Kappetz; while the Plant Protection Problems were in charge of Dr F. Beran, and satisfactory co-operation with the peasants seemed to be achieved. Much soil analysis was being done though field experiments to check the results were not made; I urged that they should be.

The grapes were ripening and were being gathered in; the new wine was being made. It was a very happy time in the countryside and in each wine district we visited we were invited to the caves or cellars to compare the various vintages. Here we would sit on wooden benches at a long rough table lighted by a few candles; the bottles of wine would be set out, we would taste a little, then empty our glass into a jug or basin. It was not so much an operation as a ritual: it had even a special vocabulary. Wine grapes are *veredelten Sorten*—ennobled sorts; a harvest of corn or of apples is an *Ernte* but of grapes for wine is a *Lese*; you *trinken* beer or cider but *kosten* wine. You are presented with a programme starting with a light wine, working up to the best. The ritual had to be followed closely: first the wine must be held to the light to see if it is clear; then, smelled, a little is then poured into the mouth, rolled round the palate with the tongue and swallowed. After about five tests the gums must be cleaned by chewing some bread; for this a little *Imbiss* is provided—bread, cold meat, cheese—then the tasting is resumed. Finally comes the *Drüberstreuer*, so-called because if you have done your duty by the preceding samples it simply dribbles on to your beard; then comes the new wine which however I would never drink as I was assured it might deprive me of the use of my legs in the morning. Meanwhile we were regaled with stories of the

great men of the past, nor one who drank thirty *viertels* (6½ quarts) at a sitting—which no one in these degenerate days could do; of another who, admonished because he was smoking and drinking rather heavily, replied: 'My grandfather drank very much and smoked very much and lived to be ninety, but my brother never drank and never smoke and died when he was six months old. Old country sayings would be recalled such as 'Man saust, und man stirbt; man saust nicht, man stirbt doch'—'You drink and you die: you don't drink, but you die all the same'. Then they would drop into the dialect and discuss the finer points of the wines and I could no longer follow them. Elnor and I sat on in the gloom, feeling a little like conspirators and wishing we could be out in the sunshine exploring the little town or getting up the heights to see the view. But there was no hurrying our hosts; when you are tasting wine, they said, you mustn't bring a timetable with you.

The joy in life of the Austrians, particularly of the Viennese, was a pleasure to watch. Heaps of rubble might wait but the opera had to get going again. Copper supplied under the European Recovery Programme for making electric cables had been used for covering the dome of Salzburg Opera House. People who had money spent it freely: the restaurants, even the very expensive ones, were full at lunch times and in the evenings. The theatre was packed, and the poor quality of the clothes suggested that few of the audience were well off. Average professional incomes, I was told, were about 900 schellings per month (about £270 per annum): as usual in poor countries this was not much more than a farm worker's wage (about 400-500 schellings a month with potatoes, bread grain, vegetables, wood, milk and other things in addition).

I asked the Minister for Agriculture whether Austria could become self-sufficient in food production now that it was separated from the plains of Hungary and Transylvania. He thought not. Grain and oil would always have to be imported as was even wine at present. The area of cultivated land and pasture, including mountain pasture (*Almen*), was only 1½ acres per head and this could not produce enough food. Austria, he said, is not a good economic unit: coal, iron, phosphates, and potash all have to be imported. There is oil, but the Russians may take much of that.

The solution proposed was the expansion of light industry: extensive development of hydro-electric power was projected, Austria being well off for usable streams. Later I met our Commander-in-Chief; he did not think Austria could ever become self-supporting but would always need assistance. But as Austria is a bastion of Western civilization we must always be prepared to give it. From all that I had seen this seemed a sound conclusion.

On returning at the end of October I reassembled the material I had collected from my British Association address on World Population and World Food Supplies. There was far more than I had been able to use, yet it was only a fraction of what I had available. In all of my agricultural journeys I had kept full diaries, and on returning home had them typed, checked wherever possible, and bound with the relevant documents inserted. A duplicate copy without added documents was placed in the Rothamsted library. Also I had considerable material sent me by old colleagues. Notable interest was being taken in the question whether world population was outstripping food resources and a number of books appeared, some fairly good, some deplorably bad and exploiting the sensational possibilities of the subject. I had the material for factual treatment and decided to work it up into a book which, I hoped, would give the intelligent reader a fair picture of the position and of the possibilities, and also assist administrators and technical staffs in their efforts at improvement. The winter was devoted to this task, varied, however, with lecturing, broadcasting, writing articles and reviews and other occupations. The book grew only slowly; most of it was written three times with intervals betweenwhiles before I was satisfied with it, that had been my invariable custom for all important publications.

1950 was one of the busiest years of my life for it gave me the opportunity of revisiting some of the countries I should have to describe and of seeing others which were new to me. During the spring we combined a number of engagements into an extended agricultural tour of South-Western and Eastern England, and the eastern section of Eire. Important international conferences on botany and on soils were held respectively in Stockholm and in Amsterdam, during July of each of which I was elected an Honorary President. Elnor and I duly attended and took part in the



Reception University of Durham D.Sc. 1979 (as President of the British Association) (P1 - Newcastle Chronicle)

80th Birthday dinner Apothecaries Hall The President of the Royal Society proposing the toast (P1 to Plant Protection Unit)



excursion round Holland. A little later came the British Association meetings at Birmingham which unfortunately we had to leave before the end to catch our steamer for Mombasa to begin the African and Indian journeys already described. It was the end of March before we returned home, having been absent for some nine months and travelled some 30,000 miles. During the remainder of 1951 I pushed on with the book and visited my old college at Aberystwyth, on the Council of which I have the honour of serving, and also Wye College of which I had been elected the first Fellow; these visits are now annual events.

In 1952 we were back in Italy and in Northern Ireland with Le Play groups studying agricultural and other problems, but the outstanding event was a dinner organized by Plant Protection Ltd. on the occasion of my eightieth birthday. It was held in Apothecaries' Hall, which had fortunately escaped bomb damage: while at Epps I had occasionally been sent there on errands and had always wanted to go up the stairs and see the Hall itself; now after sixty-two years the chance had come. It was a most distinguished gathering including the President and Past President of the Royal Society, Lord Bledisloe, Earl Radnor, Walter Elliot, and representatives of the great agricultural organizations and other bodies. I felt overwhelmed by the kind things said about me and deeply grateful to my generous hosts for all they had done.

In the spring of 1953 I was again in Spain, studying agricultural and peasant problems; then came the invitation to Westminster Abbey for the Coronation on June 2nd: perhaps the most wonderful day of my life. Never had I seen such pageantry. I felt as if transported to the sixteenth century and living through pages of Queen Mary's Psalter. Later we went with a Le Play group to County Clare to study peasant problems in the West of Ireland. Here there is a steady depopulation in spite of all Government efforts to revive the ancient Irish language and the old Irish way of life. I asked a young woman in Connemara whether she would not like to marry a Connemara man, have a little farm, talk Irish and dance Irish jigs, but she was quite definite: she wanted to go to Chicago, so did the other girls. An aunt living there would send the fare, and the Catholic Society would look after her on the journey. The boys, she said, wanted to go to

England where wages were high. Not long afterwards a letter from a Chicago friend came as a lively commentary on the girl's attitude: 'we now have a daily help, a coloured woman who drives up in her high powered car, and draws \$6 (£2 2s.) daily for six hours work.' And I thought of that girl who could have all this plus shops, cinemas, and other joys, or, in the alternative, a Connemara cottage, a cow, a few pigs and chickens and a very wet climate.

A few weeks later I was given the Honorary Degree of Doctor of Science of the University of Reading and had the special satisfaction of being presented by a friend and colleague of many years' standing, W. B. Prierley; among my fellow graduates were Dame Ninette de Valois, Baron Aberconway and Sir Henry Tizard.

September 15th, 1953, was our Golden Wedding Day and the President and Fellows of St John's College kindly allowed us the use of their beautiful Hall for the Party to which old friends came from far and near. Lord and Lady Bledisloe came from Gloucestershire, a large group came from Rothamsted, and a contingent from Wye; it was a most happy occasion.

1954 saw no slackening in interesting events: in the spring we had a delightful cruise in the Mediterranean visiting places in the eastern section that I had always wanted to see but always missed; then in July at the Royal Show at Windsor the Queen gave me the Gold Medal of the Royal Agricultural Society of which I am particularly proud as it makes me an Honorary Member of the Society: I have long been a Vice-President. Not long afterwards Messrs Allen and Unwin published the big book, *World Population and World Food Supplies*: it was well received and brought me a number of interesting letters from various parts of the world.

In the spring of 1955 we were again in Sicily and in Rome where I lectured to the staff of the Food and Agricultural Organization of the United Nations. Shortly after returning home the Royal Geographical Society awarded me their Victoria Gold Medal which gave me special pleasure as I had always sought to link geographical studies with investigations on soil and with agricultural developments.

In July I was back in Manchester delivering the Beckly Lec-

ture. This gave me the opportunity to discuss some of the difficult social problems arising out of the rapid developments of science and technology that had long interested me; I had a splendidly responsive audience with my old friend Professor H. C. Pawson in the chair. It was a particular pleasure that one of the old Renshaw Street children had gathered a little group of the survivors from the early Manchester days and took us out to her very comfortable home to meet them and to hear of their doings. Life for many of them had been very happy even though mingled with sadness at times. For an hour we were back in the late 1890's the days of their childhood and my early struggles; as we recalled them they seemed like a golden afternoon in summer when the sun would never set. Later came the British Association meeting at Bristol and another visit to Rome where we attended the International Potash Technical Conference at which I was elected President for 1956: we hurried home to attend the wedding of our youngest son, Hugh, which took place on the anniversary of our own wedding day.

There for the present the record ends. Fortune has indeed smiled upon me. After some search I had found my work and had much joy in doing it. I have made no fortune, but my life has been cast in very pleasant places. I have been particularly happy in my home and my friends, and in the health and strength which have enabled me to do something, which, though far short of what I wished, has I hope proved of service to others travelling the same road. The land had called me and I had done my best to answer the call. I have no intention of stopping work. My wish, well expressed in the words of Winifred Holtby's epitaph:

God give me work
Till my life shall end,
And life
Till my work is done

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